CITY MULTI® WY-SERIES SYSTEM DESIGN

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1. ELECTRICAL WORK

1-1. General Cautions

① Follow ordinance of your governmental organization for technical standard related to electrical equipment, wiring regulations, and guidance of each electric power company.

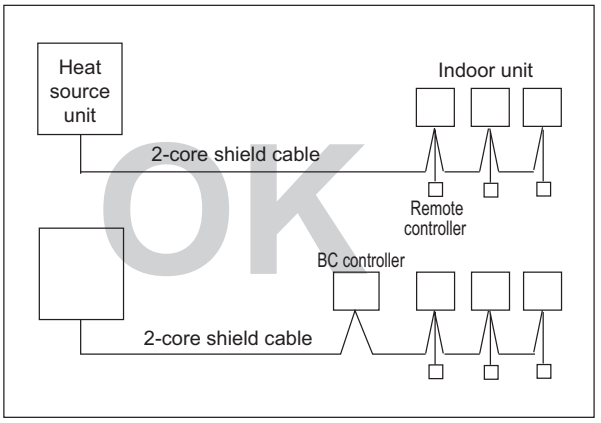
② Wiring for control (hereinafter referred to as transmission cable) shall be (50mm[1-5/8in] or more) apart from power source wiring so that it is not influenced by electric noise from power source wiring. (Do not insert transmission cable and power source wire in the same conduit.)

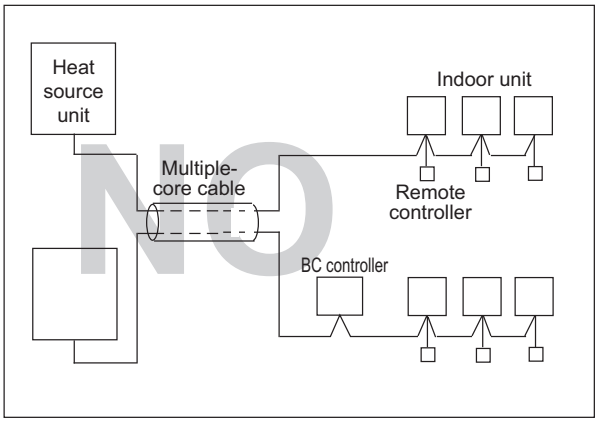
③ Be sure to provide designated grounding work to heat source unit.

④ Give some allowance to wiring for electrical part box of indoor and heat source unit, because the box is sometimes removed at the time of service work.

⑤ Never connect 100V, 208~230V, 460V power source to terminal block of transmission cable. If connected,electrical parts will be burnt out.

⑥ Use 2-core shield cable for transmission cable . If transmission cables of different systems are wired with the same multiplecore cable, the resultant poor transmitting and receiving will cause erroneous operations.





1-2. Power Supply for Indoor Unit and Water-source Unit

1-2-1. Electrical Characteristics of Indoor Unit

Symbols: MCA : Min.Circuit Amps (=1.25xFLA) FLA : Full Load Amps

IFM :Indoor Fan Motor Output : Fan motor rated output

Model	Indoor Unit				IFM
	Hz	Volts	Voltage range	MCA(A)	FLA(A)
PLFY-P06NLMU-E	60Hz	208 / 230V	188 to 253V	0.43 / 0.47	0.34 / 0.37
PLFY-P08NLMU-E				0.43 / 0.47	0.34 / 0.37
PLFY-P12NLMU-E				0.43 / 0.47	0.34 / 0.37
PLFY-P15NLMU-E				0.48 / 0.53	0.38 / 0.42
PLFY-P18NLMU-E				0.49 / 0.54	0.39 / 0.43
PLFY-P08NCMU-E			198 to 253V	0.29 / 0.29	0.23 / 0.23
PLFY-P12NCMU-E				0.35 / 0.35	0.28 / 0.28
PLFY-P15NCMU-E				0.35 / 0.35	0.28 / 0.28
PLFY-P12NBMU-E				0.64 / 0.64	0.51 / 0.51
PLFY-P15NBMU-E				0.64 / 0.64	0.51 / 0.51
PLFY-P18NBMU-E				0.64 / 0.64	0.51 / 0.51
PLFY-P24NBMU-E				0.64 / 0.64	0.51 / 0.51
PLFY-P30NBMU-E				0.64 / 0.64	0.51 / 0.51
PLFY-P36NBMU-E				1.25 / 1.25	1.00 / 1.00
PMFY-P06NBMU-E	60Hz	208 / 230V	188 to 253V	0.25 / 0.25	0.20 / 0.20
PMFY-P08NBMU-E				0.25 / 0.25	0.20 / 0.20
PMFY-P12NBMU-E				0.26 / 0.26	0.21 / 0.21
PMFY-P15NBMU-E				0.33 / 0.33	0.26 / 0.26
PEFY-P06NMAU-E	60Hz	208 / 230V	198 to 253V	1.05 / 1.05	0.84 / 0.84
PEFY-P08NMAU-E				1.05 / 1.05	0.84 / 0.84
PEFY-P12NMAU-E				1.21 / 1.21	0.97 / 0.97
PEFY-P15NMAU-E				1.45 / 1.45	1.16 / 1.16
PEFY-P18NMAU-E				1.56 / 1.56	1.25 / 1.25
PEFY-P24NMAU-E				2.25 / 2.25	1.80 / 1.80
PEFY-P27NMAU-E				2.49 / 2.49	1.99 / 1.99
PEFY-P30NMAU-E				2.50 / 2.50	2.00 / 2.00
PEFY-P36NMAU-E				3.33 / 3.33	2.66 / 2.66
PEFY-P48NMAU-E				3.41 / 3.41	2.73 / 2.73
PEFY-P54NMAU-E				3.31 / 3.31	2.65 / 2.65
PEFY-P06NMSU-E	60Hz	208 / 230V	188 to 253V	0.47 / 0.50	0.32 / 0.31
PEFY-P08NMSU-E				0.47 / 0.50	0.41 / 0.39
PEFY-P12NMSU-E				0.68 / 0.74	0.46 / 0.43
PEFY-P15NMSU-E				1.20 / 1.33	0.47 / 0.45
PEFY-P18NMSU-E				1.20 / 1.33	0.64 / 0.60
PEFY-P24NMSU-E				1.57 / 1.73	0.88 / 0.83
PEFY-P27NMHU-E				1.72 / 1.89	1.37 / 1.51
PEFY-P30NMHU-E				2.08 / 2.29	1.66 / 1.83
PEFY-P36NMHU-E				4.23 / 4.67	3.38 / 3.73
PEFY-P48NMHU-E				4.23 / 4.67	3.38 / 3.73
PEFY-P54NMHU-E				4.29 / 4.73	3.43 / 3.78
PEFY-P72NMHU-E				5.60 / 6.18	4.48 / 4.94
PEFY-P96NMHU-E				7.12 / 7.85	5.69 / 6.28

1. ELECTRICAL WORK

Symbols: MCA : Min.Circuit Amps (=1.25xFLA) FLA : Full Load Amps

IFM :Indoor Fan Motor Output : Fan motor rated output

Model	Indoor Unit				IFM
	Hz	Volts	Voltage range	MCA(A)	FLA(A)
PCFY-P15NKMU-E	60Hz	208 / 230V	188 to 253V	0.44 / 0.44	0.35 / 0.35
PCFY-P24NKMU-E				0.52 / 0.52	0.41 / 0.41
PCFY-P30NKMU-E				1.22 / 1.22	0.97 / 0.97
PCFY-P36NKMU-E				1.22 / 1.22	0.97 / 0.97
PKFY-P06NBMU-E	60Hz	208 / 230V	198 to 253V	0.19 / 0.19	0.15 / 0.15
PKFY-P08NBMU-E				0.19 / 0.19	0.15 / 0.15
PKFY-P12NHMU-E				0.38 / 0.38	0.30 / 0.30
PKFY-P15NHMU-E				0.38 / 0.38	0.30 / 0.30
PKFY-P18NHMU-E				0.38 / 0.38	0.30 / 0.30
PKFY-P24NKMU-E				0.37 / 0.37	0.29 / 0.29
PKFY-P30NKMU-E				0.54 / 0.54	0.43 / 0.43
PFFY-P06NEMU-E	60Hz	208 / 230V	188 to 253V	0.32 / 0.34	0.25 / 0.27
PFFY-P08NEMU-E				0.32 / 0.34	0.25 / 0.27
PFFY-P12NEMU-E				0.34 / 0.38	0.27 / 0.30
PFFY-P15NEMU-E				0.40 / 0.44	0.32 / 0.35
PFFY-P18NEMU-E				0.48 / 0.53	0.38 / 0.42
PFFY-P24NEMU-E				0.59 / 0.64	0.47 / 0.51
PFFY-P06NRMU-E	60Hz	208 / 230V	188 to 253V	0.32 / 0.34	0.25 / 0.27
PFFY-P08NRMU-E				0.32 / 0.34	0.25 / 0.27
PFFY-P12NRMU-E				0.34 / 0.38	0.27 / 0.30
PFFY-P15NRMU-E				0.40 / 0.44	0.32 / 0.35
PFFY-P18NRMU-E				0.48 / 0.53	0.38 / 0.42
PFFY-P24NRMU-E				0.59 / 0.64	0.47 / 0.51
PVFY-P12E00A	60Hz	208 / 230V	188 to 253V	0.56 / 0.50	0.45 / 0.40
PVFY-P18E00A				1.53 / 1.38	1.22 / 1.10
PVFY-P24E00A				1.39 / 1.25	1.11 / 1.00
PVFY-P30E00A				2.50 / 2.25	2.00 / 1.80
PVFY-P36E00A				2.09 / 1.88	1.67 / 1.50
PVFY-P48E00A				2.23 / 2.00	1.78 / 1.60
PVFY-P54E00A				2.64 / 2.38	2.11 / 1.90
PWFY-P36NMU-E-BU	60Hz	208 / 230V	188 to 253V	25	-
PWFY-P36NMU-E-AU				0.09	-
PWFY-P72NMU-E-AU				0.09	-

1-2-2. Electrical Characteristics of Water-source Unit

Symbols: MCA : Min.Circuit Amps (=1.25xFLA) FLA : Full Load Amps
IFM :Indoor Fan Motor Output : Fan motor rated output

PQHY-P-T(S)HMU

Model	Unit Combination	Water-source unit						Compressor
		Hz	Volts	Voltage range	RLA(A)	MCA(A)	Max.Fuse(A)	SC(A)
PQHY-P72THMU-A	-	60Hz	208/230V	188 to 253V	12.2/11.0	16/14	25/20	15
PQHY-P96THMU-A	-				17.4/15.8	22/20	30/30	15
PQHY-P120THMU-A	-				23.0/20.8	29/26	50/40	15
PQHY-P144TSHMU-A	PQHY-P72THMU-A				12.2/11.0	16/14	25/20	15
	PQHY-P72THMU-A				12.2/11.0	16/14	25/20	15
PQHY-P168TSHMU-A	PQHY-P72THMU-A				12.2/11.0	16/14	25/20	15
	PQHY-P96THMU-A				17.4/15.8	22/20	30/30	15
PQHY-P192TSHMU-A	PQHY-P96THMU-A				17.4/15.8	22/20	30/30	15
	PQHY-P96THMU-A				17.4/15.8	22/20	30/30	15
PQHY-P216TSHMU-A	PQHY-P96THMU-A				17.4/15.8	22/20	30/30	15
	PQHY-P120THMU-A				23.0/20.8	29/26	50/40	15
PQHY-P240TSHMU-A	PQHY-P120THMU-A				23.0/20.8	29/26	50/40	15
	PQHY-P120THMU-A				23.0/20.8	29/26	50/40	15
PQHY-P264TSHMU-A	PQHY-P72THMU-A				12.2/11.0	16/14	25/20	15
	PQHY-P96THMU-A				17.4/15.8	22/20	30/30	15
	PQHY-P96THMU-A				17.4/15.8	22/20	30/30	15
PQHY-P288TSHMU-A	PQHY-P96THMU-A				17.4/15.8	22/20	30/30	15
	PQHY-P96THMU-A				17.4/15.8	22/20	30/30	15
	PQHY-P96THMU-A				17.4/15.8	22/20	30/30	15
PQHY-P312TSHMU-A	PQHY-P96THMU-A				17.4/15.8	22/20	30/30	15
	PQHY-P96THMU-A				17.4/15.8	22/20	30/30	15
	PQHY-P120THMU-A				23.0/20.8	29/26	50/40	15
PQHY-P336TSHMU-A	PQHY-P96THMU-A				17.4/15.8	22/20	30/30	15
	PQHY-P120THMU-A				23.0/20.8	29/26	50/40	15
	PQHY-P120THMU-A				23.0/20.8	29/26	50/40	15
PQHY-P360TSHMU-A	PQHY-P120THMU-A				23.0/20.8	29/26	50/40	15
	PQHY-P120THMU-A				23.0/20.8	29/26	50/40	15
	PQHY-P120THMU-A				23.0/20.8	29/26	50/40	15

Symbols: MCA : Min.Circuit Amps (=1.25xFLA) FLA : Full Load Amps
IFM :Indoor Fan Motor Output : Fan motor rated output

PQHY-P-Y(S)HMU

Model	Unit Combination	Water-source unit						Compressor
		Hz	Volts	Voltage range	RLA(A)	MCA(A)	Max.Fuse(A)	SC(A)
PQHY-P72YHMU-A	-	60Hz	460V	414 to 506V	5.5	7	15	7
PQHY-P96YHMU-A	-				7.9	10	15	7
PQHY-P120YHMU-A	-				10.4	13	20	7
PQHY-P144YSHMU-A	PQHY-P72YHMU-A				5.5	7	15	7
	PQHY-P72YHMU-A				5.5	7	15	7
PQHY-P168YSHMU-A	PQHY-P72YHMU-A				5.5	7	15	7
	PQHY-P96YHMU-A				7.9	10	15	7
PQHY-P192YSHMU-A	PQHY-P96YHMU-A				7.9	10	15	7
	PQHY-P96YHMU-A				7.9	10	15	7
PQHY-P216YSHMU-A	PQHY-P96YHMU-A				7.9	10	15	7
	PQHY-P120YHMU-A				10.4	13	20	7
PQHY-P240YSHMU-A	PQHY-P120YHMU-A				10.4	13	20	7
	PQHY-P120YHMU-A				10.4	13	20	7
PQHY-P264YSHMU-A	PQHY-P72YHMU-A				5.5	7	15	7
	PQHY-P96YHMU-A				7.9	10	15	7
	PQHY-P96YHMU-A				7.9	10	15	7
PQHY-P288YSHMU-A	PQHY-P96YHMU-A				7.9	10	15	7
	PQHY-P96YHMU-A				7.9	10	15	7
	PQHY-P96YHMU-A				7.9	10	15	7
PQHY-P312YSHMU-A	PQHY-P96YHMU-A				7.9	10	15	7
	PQHY-P96YHMU-A				7.9	10	15	7
	PQHY-P120YHMU-A				10.4	13	20	7
PQHY-P336YSHMU-A	PQHY-P96YHMU-A				7.9	10	15	7
	PQHY-P120YHMU-A				10.4	13	20	7
	PQHY-P120YHMU-A				10.4	13	20	7
PQHY-P360YSHMU-A	PQHY-P120YHMU-A				10.4	13	20	7
	PQHY-P120YHMU-A				10.4	13	20	7
	PQHY-P120YHMU-A				10.4	13	20	7

1. ELECTRICAL WORK

1-3. Power Cable Specifications

Thickness of wire for main power supply, capacities of the switch and system impedance								
	Model	Minimum wire thickness (mm^2/AWG)			Breaker for current leakage	Local Switch (A)		Breaker for wiring (NFB)
		Main cable	Branch	Ground		Capacity	Fuse	
Water-source unit	PQHY-P72THMU-A	3.3/12	-	3.3/12	20A 30mA or 100mA 0.1sec. or less	20	25	20
	PQHY-P96THMU-A	5.3/10	-	5.3/10	30A 30mA or 100mA 0.1sec. or less	30	30	30
	PQHY-P120THMU-A	8.4/8	-	8.4/8	40A 100mA 0.1sec. or less	40	50	40
Indoor unit		0.41/22	0.41/22	0.41/22	15A 30mA or 100mA 0.1sec. or less	15	15	15

Thickness of wire for main power supply, capacities of the switch and system impedance								
	Model	Minimum wire thickness (mm^2/AWG)			Breaker for current leakage	Local Switch (A)		Breaker for wiring (NFB)
		Main cable	Branch	Ground		Capacity	Fuse	
Water-source unit	PQHY-P72YHMU-A	2.1/14	-	2.1/14	15A 30mA or 100mA 0.1sec. or less	15	15	15
	PQHY-P96YHMU-A	2.1/14	-	2.1/14	15A 30mA or 100mA 0.1sec. or less	15	15	15
	PQHY-P120YHMU-A	3.3/12	-	3.3/12	20A 30mA or 100mA 0.1sec. or less	20	20	20
Indoor unit		0.41/22	0.41/22	0.41/22	15A 30mA or 100mA 0.1sec. or less	15	15	15

1. Use dedicated power supplies for the heat source unit and indoor unit. Ensure OC and OS are wired individually.
2. Bear in mind ambient conditions (ambient temperature,direct sunlight, rain water,etc.) when proceeding with the wiring and connections.
3. The wire size is the minimum value for metal conduit wiring. If the voltage drops, use a wire that is one rank thicker in diameter. Make sure the power-supply voltage does not drop more than 10%.
4. Specific wiring requirements should adhere to the wiring regulations of the region.
5. Power supply cords of parts of appliances for heat source use shall not be lighter than polychloroprene sheathed flexible cord (design 245 IEC57). For example, use wiring such as YZW.
6. A switch with at least 3 mm [1/8 in.] contact separation in each pole shall be provided by the Air Conditioner installer.

WARNING

• Be sure to use specified wires for connections and ensure no external force is imparted to terminal connections. If connections are not fixed firmly, heating or fire may result.
• Be sure to use the appropriate type of overcurrent protection switch. Note that generated overcurrent may include some amount of direct current.

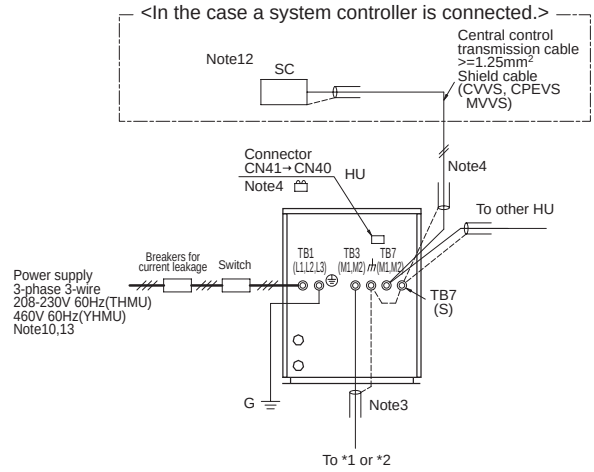
CAUTION

• Some installation sites may require attachment of an earth leakage breaker for the inverter. If no earth leakage breaker is installed, there is a danger of electric shock.
• Do not use anything other than a breaker and fuse with the correct capacity. Using a fuse or wire of too large capacity may cause malfunction or fire.

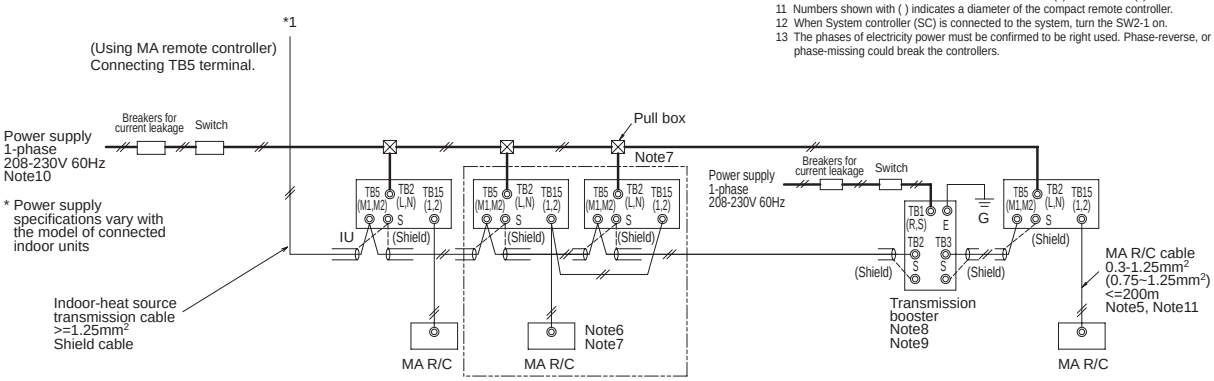
1-4. Power Supply Examples

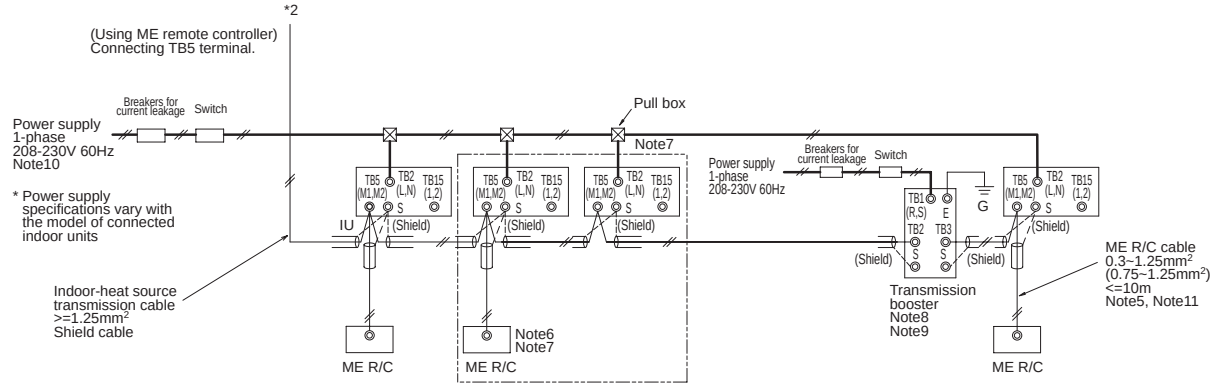
The local standards and/or regulations is applicable at a higher priority.

1-4-1. PQHY-P72, 96, 120THMU/YHMU



Note:
1 The transmission cable is not-polarity double-wire.
2 Symbol ◎ means a screw terminal for wiring.
3 The shield wire of transmission cable should be connected to the grounding terminal at Heat source unit. All shield wire of M-Net transmission cable among Indoor units should be connected to the S terminal at Indoor unit or all shield wire should be connected together.
The broken line at the scheme means shield wire.
4 When the Heat source unit connected with system controller, power-supply to TB7 of the heat source unit(s) is needed. The connector change from CN41 to CN40 at one of the heat source units will enable the heat source unit to supply power to TB7, or an extra power supplying unit PAC-SC51KUA should be used. The transmission cable (above 1.25mm², shielded, CVVS/CPEVS/MVVS) among Heat source units and system controllers is called central control transmission cable. The shield wire of the central control transmission cable must be grounded at the Heat source unit whose CN41 is changed to CN40.
5 MA R/C transmission cable (0.3-1.25mm²) must be less than 200m in length, while ME R/C transmission cable (0.3-1.25mm²) must be less than 10m in length. But transmission cable to the ME R/C can be extend using a M-NET cable (>=1.25mm²) when the length is counted in the M-Net length. Both Compact MA and ME R/C transmission cables size 0.75~1.25mm² in thickness.
6 MA remote controller and ME remote controller should not be grouped together.
7 If using 1 or 2 (main/sub) MA remote controller to control more than 1 Indoor unit, use MA transmission cable to connect all the TB15 terminals of the Indoor units. It is called "Grouping".
If using 1 or 2 (main/sub) ME remote controller control more than 1 indoor unit, set address to Indoor unit and ME remote controller. For the method, refer to 2-4. "Address Setting".
8 Indoor board consumes power from TB3. The power balance should be considered according to System Design 2-3 "System configuration restrictions".
9 If Transmission booster is needed, be sure to connect the shield wires to the both sides to the booster.
10 The critical current for choosing power source equipment is approximate 1.4 times of total rated current of the Heat source unit(s) or Indoor unit(s).
11 Numbers shown with ( ) indicates a diameter of the compact remote controller.
12 When System controller (SC) is connected to the system, turn the SW2-1 on.
13 The phases of electricity power must be confirmed to be right used. Phase-reverse, or phase-missing could break the controllers.





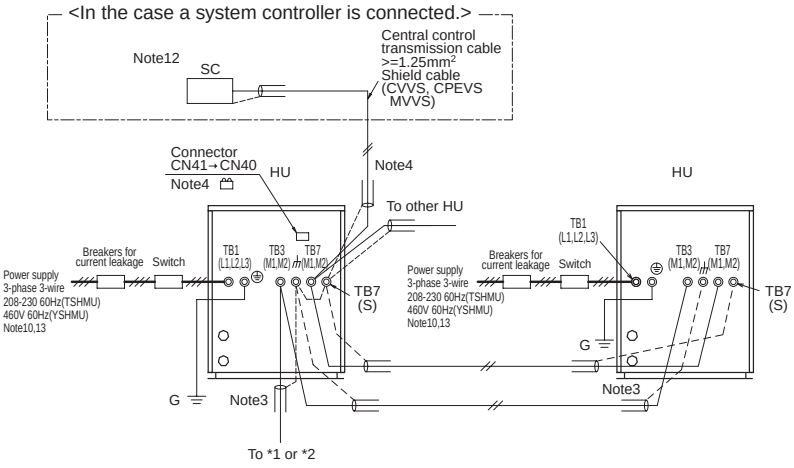
Symbol		Model	Breakers for current leakage *1, *2	Switch BC <A>	Switch OCP*3 <A>	Switch (NFB) <A>	Minimum Wire thickness Power wire <mm²/AWG>	Minimum Wire thickness G wire <mm²/AWG>
BC	Breaker capacity	PQHY-P72THMU	20A 30mA or 100mA 0.1sec. or less	20	25	20	3.3/12	3.3/12
OCP	Over-current protector	PQHY-P96THMU	30A 30mA or 100mA 0.1sec. or less	30	30	30	5.3/10	5.3/10
NFB	Non-fuse breaker	PQHY-P120THMU	40A 100mA 0.1sec. or less	40	50	40	8.4/8	8.4/8
HU	Heat source unit	PQHY-P72YHMU	15A 30mA or 100mA 0.1sec. or less	15	15	15	2.1/14	2.1/14
IU	Indoor unit	PQHY-P96YHMU	15A 30mA or 100mA 0.1sec. or less	15	15	15	2.1/14	2.1/14
SC	System controller	PQHY-P120YHMU	20A 30mA or 100mA 0.1sec. or less	20	20	20	3.3/12	3.3/12
MA R/C	MA remote controller							
ME R/C	ME remote controller							

*1 The breakers for current leakage should support Inverter circuit. (e.g. Mitsubishi Electric's NV-C series or equivalent).
*2 Breakers for current leakage should combine using of switch.
*3 It shows data for B-type fuse of the breaker for current leakage.

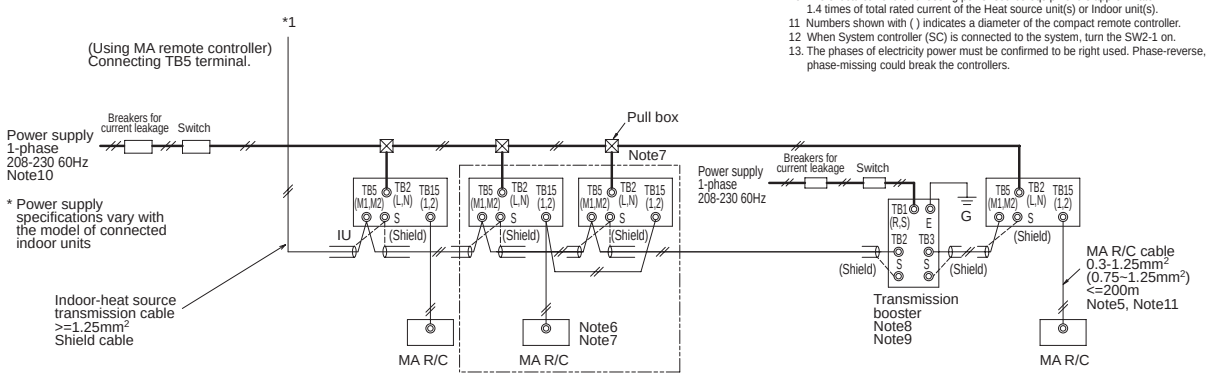
1. ELECTRICAL WORK

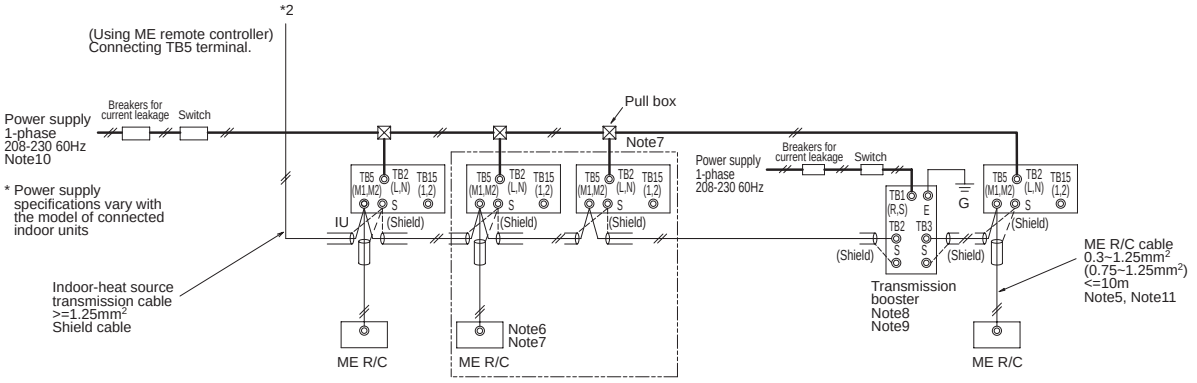
The local standards and/or regulations is applicable at a higher priority.

1-4-2. PQHY-P144, 168, 192, 216, 240TSHMU/YSHMU



Note:
1 The transmission cable is not-polarity double-wire.
2 Symbol ◎ means a screw terminal for wiring.
3 The shield wire of transmission cable should be connected to the grounding terminal at Heat source unit. All shield wire of M-Net transmission cable among Indoor units should be connected to the S terminal at Indoor unit or all shield wire should be connected together.
The broken line at the scheme means shield wire.
4 When the Heat source unit connected with system controller, power-supply to TB7 of the heat source unit(s) is needed. The connector change from CN41 to CN40 at one of the heat source units will enable the heat source unit to supply power to TB7, or an extra power supplying unit PAC-SC51KUA should be used. The transmission cable (above 1.25mm2, shielded, CVVS/CPEVS/MVVS) among Heat source units and system controllers is called central control transmission cable. The shield wire of the central control transmission cable must be grounded at the Heat source unit whose CN41 is changed to CN40.
5 MA R/C transmission cable (0.3-1.25mm2) must be less than 200m in length, while ME R/C transmission cable (0.3-1.25mm2) must be less than 10m in length. But transmission cable to the ME R/C can be extend using a M-NET cable (>=1.25mm2) when the length is counted in the M-Net length. Both Compact MA and ME R/C transmission cables size 0.75~1.25mm2 in thickness.
6 MA remote controller and ME remote controller should not be grouped together.
7 If using 1 or 2 (main/sub) MA remote controller to control more than 1 Indoor unit, use MA transmission cable to connect all the TB15 terminals of the Indoor units. It is called "Grouping".
If using 1 or 2 (main/sub) ME remote controller control more than 1 indoor unit, set address to Indoor unit and ME remote controller. For the method, refer to 2-4. "Address Setting".
8 Indoor board consumes power from TB3. The power balance should be considered according to System Design 2-3 "System configuration restrictions".
9 If Transmission booster is needed, be sure to connect the shield wires to the both sides to the booster.
10 The critical current for choosing power source equipment is approximate 1.4 times of total rated current of the Heat source unit(s) or Indoor unit(s).
11 Numbers shown with ( ) indicates a diameter of the compact remote controller.
12 When System controller (SC) is connected to the system, turn the SW2-1 on.
13. The phases of electricity power must be confirmed to be right used. Phase-reverse, or phase-missing could break the controllers.





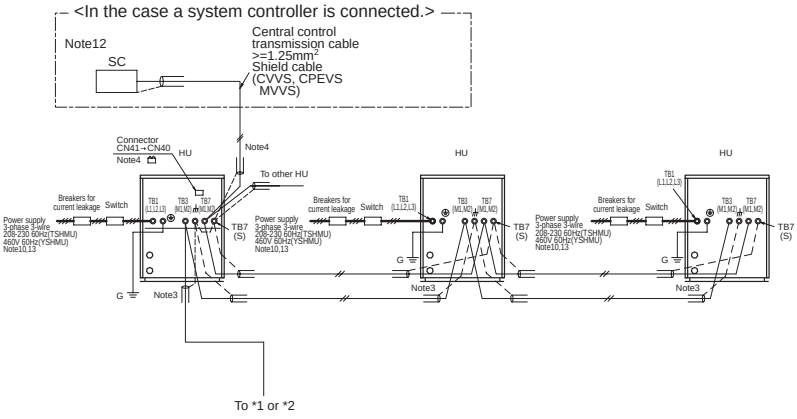
Symbol		Model	Breakers for current leakage *1, *2	Switch BC <A>	Switch OCP*3 <A>	Switch (NFB) <A>	Minimum Wire thickness Power wire <mm2/AWG>	Minimum Wire thickness G wire <mm2/AWG>
BC	Breaker capacity	PQHY-P72THMU	20A 30mA or 100mA 0.1sec. or less	20	25	20	3.3/12	3.3/12
OCP	Over-current protector	PQHY-P96THMU	30A 30mA or 100mA 0.1sec. or less	30	30	30	5.3/10	5.3/10
NFB	Non-fuse breaker	PQHY-P120THMU	40A 100mA 0.1sec. or less	40	50	40	8.4/8	8.4/8
HU	Heat source unit	PQHY-P72YHMU	15A 30mA or 100mA 0.1sec. or less	15	15	15	2.1/14	2.1/14
IU	Indoor unit	PQHY-P96YHMU	15A 30mA or 100mA 0.1sec. or less	15	15	15	2.1/14	2.1/14
SC	System controller	PQHY-P120YHMU	20A 30mA or 100mA 0.1sec. or less	20	20	20	3.3/12	3.3/12
MA R/C	MA remote controller							
ME R/C	ME remote controller							

*1 The breakers for current leakage should support Inverter circuit. (e.g. Mitsubishi Electric's NV-C series or equivalent).
*2 Breakers for current leakage should combine using of switch.
*3 It shows data for B-type fuse of the breaker for current leakage.

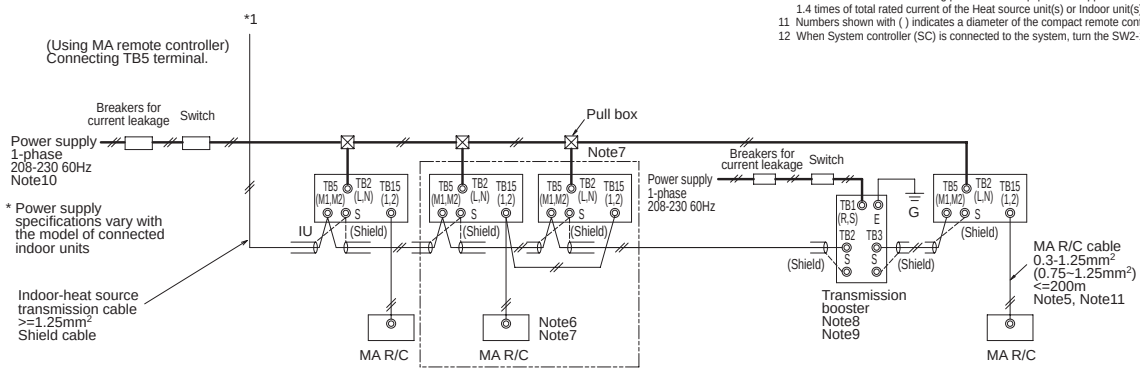
1. ELECTRICAL WORK

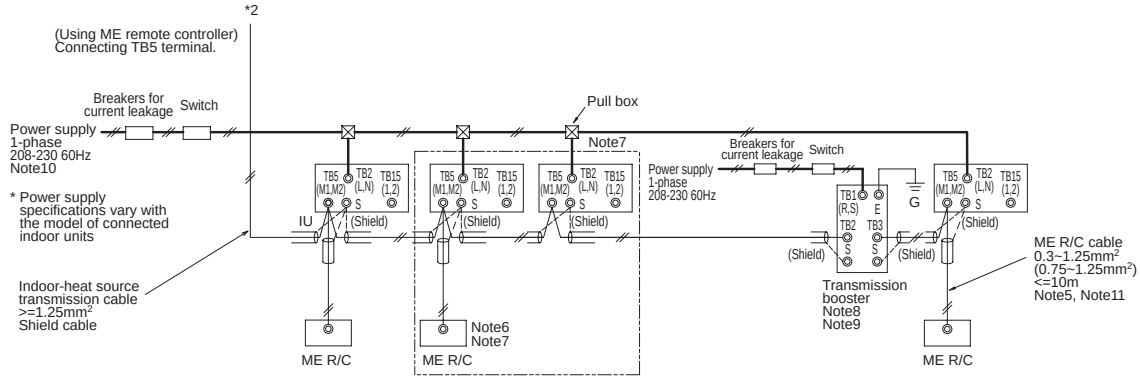
The local standards and/or regulations is applicable at a higher priority.

1-4-3. PQHY-P264, 288, 312, 336, 360TSHMU/YSHMU



Note:
1 The transmission cable is not-polarity double-wire.
2 Symbol ◎ means a screw terminal for wiring.
3 The shield wire of transmission cable should be connected to the grounding terminal at Heat source unit. All shield wire of M-Net transmission cable among Indoor units should be connected to the S terminal at Indoor unit or all shield wire should be connected together.
The broken line at the scheme means shield wire.
4 When the Heat source unit connected with system controller, power-supply to TB7 of the heat source unit(s) is needed. The connector change from CN41 to CN40 at one of the heat source units will enable the heat source unit to supply power to TB7, or an extra power supplying unit PAC-SC51KUA should be used. The transmission cable (above 1.25mm², shielded, CVVS/CPEVS/MVVS) among Heat source units and system controllers is called central control transmission cable. The shield wire of the central control transmission cable must be grounded at the Heat source unit whose CN41 is changed to CN40.
5 MA R/C transmission cable (0.3-1.25mm²) must be less than 200m in length, while ME R/C transmission cable (0.3-1.25mm²) must be less than 10m in length. But transmission cable to the ME R/C can be extend using a M-NET cable (>=1.25mm²) when the length is counted in the M-Net length. Both Compact MA and ME R/C transmission cables size 0.75~1.25mm² in thickness.
6 MA remote controller and ME remote controller should not be grouped together.
7 If using 1 or 2 (main/sub) MA remote controller to control more than 1 Indoor unit, use MA transmission cable to connect all the TB15 terminals of the Indoor units. It is called "Grouping".
If using 1 or 2 (main/sub) ME remote controller control more than 1 indoor unit, set address to Indoor unit and ME remote controller. For the method, refer to 2-4. "Address Setting".
8 Indoor board consumes power from TB3. The power balance should be considered according to System Design 2-3 "System configuration restrictions".
9 If Transmission booster is needed, be sure to connect the shield wires to the both sides to the booster.
10 The critical current for choosing power source equipment is approximate 1.4 times of total rated current of the Heat source unit(s) or Indoor unit(s).
11 Numbers shown with ( ) indicates a diameter of the compact remote controller.
12 When System controller (SC) is connected to the system, turn the SW2-1 on.





Symbol	
BC	Breaker capacity
OCP	Over-current protector
NFB	Non-fuse breaker
HU	Heat source unit
IU	Indoor unit
SC	System controller
MA R/C	MA remote controller
ME R/C	ME remote controller

Model	Breakers for current leakage *1, *2	Switch BC <A>	Switch OCP*3 <A>	Switch (NFB) <A>	Minimum Wire thickness Power wire <mm²/AWG>	Minimum Wire thickness G wire <mm²/AWG>
PQHY-P72THMU	20A 30mA or 100mA 0.1sec. or less	20	25	20	3.3/12	3.3/12
PQHY-P96THMU	30A 30mA or 100mA 0.1sec. or less	30	30	30	5.3/10	5.3/10
PQHY-P120THMU	40A 100mA 0.1sec. or less	40	50	40	8.4/8	8.4/8
PQHY-P72YHMU	15A 30mA or 100mA 0.1sec. or less	15	15	15	2.1/14	2.1/14
PQHY-P96YHMU	15A 30mA or 100mA 0.1sec. or less	15	15	15	2.1/14	2.1/14
PQHY-P120YHMU	20A 30mA or 100mA 0.1sec. or less	20	20	20	3.3/12	3.3/12

*1 The breakers for current leakage should support Inverter circuit. (e.g. Mitsubishi Electric's NV-C series or equivalent).
*2 Breakers for current leakage should combine using of switch.
*3 It shows data for B-type fuse of the breaker for current leakage.

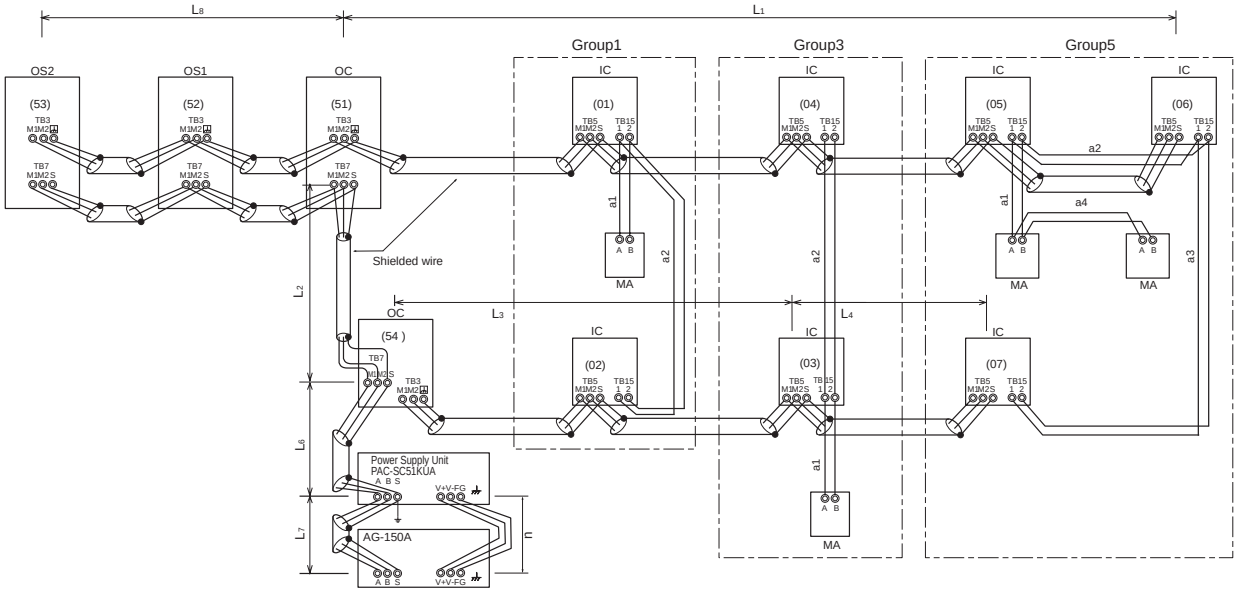
2. M-NET CONTROL

2-1. Transmission Cable Length Limitation

2-1-1. Using MA Remote controller

Long transission cable causes voltage down, therefore, the length limitation should be obeyed to secure proper transmission.

Max. length via Heat source (M-NET cable)	L1+L2+L3+L4, L1+L2+L6+L7, L3+L4+L6+L7	<=500m[1640ft.]	1.25mm^2 [AWG16] or thicker
Max. length to Heat source (M-NET cable)	L1+L8, L3+L4, L6, L2+L6+L8, L7	<=200m[656ft.]	1.25mm^2 [AWG16] or thicker
Max. length from MA to Indoor	a1+a2, a1+a2+a3+a4	<=200m[656ft.]	0.3-1.25 mm^2 [AWG22-16]
24VDC to AG-150A	n	<=50m[164ft.]	0.75-2.0 mm^2 [AWG18-14]



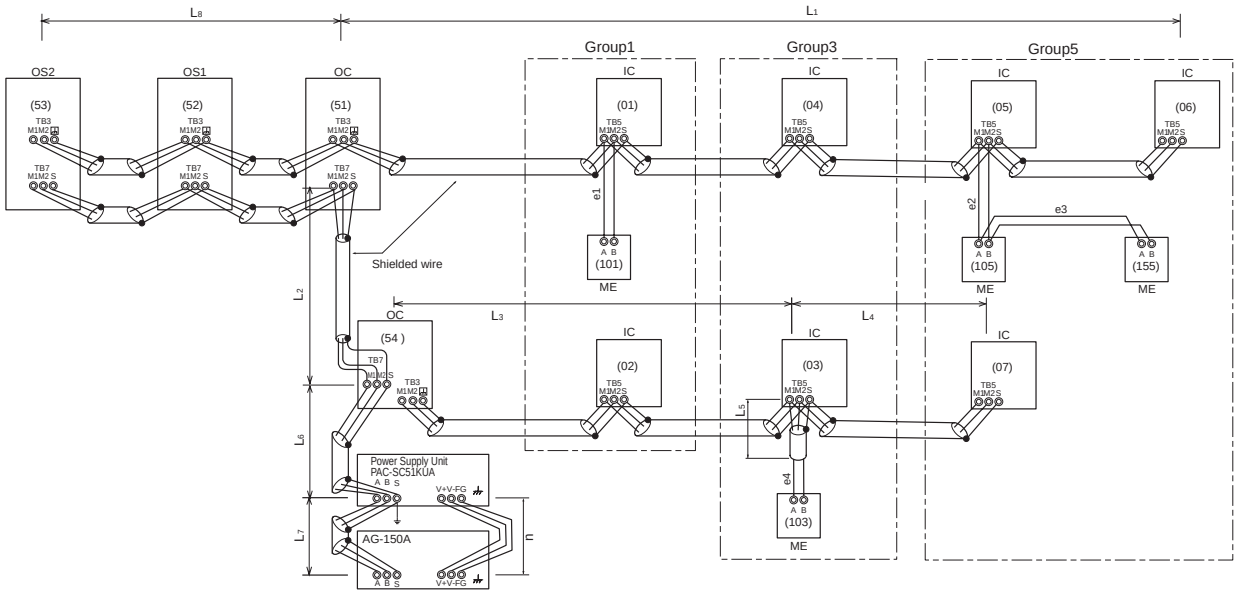
OC, OS1, OS2 : Heat source unit controller; IC: Indoor unit controller; MA: MA remote controller

2-1-2. Using ME Remote controller

Long transmission cable causes voltage down, therefore, the length limitation should be obeyed to secure proper transmission.

Max. length via Heat source (M-NET cable)	L1+L2+L3+L4, L1+L2+L6+L7,L1+L2+L3+L5, L3+L4+L6+L7	<=500m[1640ft.]	1.25mm^2 [AWG16] or thicker
Max. length to Heat source (M-NET cable)	L1+L8, L3+L4, L6, L2+L6+L8, L7, L3+L5	<=200m[656ft.]	1.25mm^2 [AWG16] or thicker
Max. length from ME to Indoor	e1, e2+e3, e4	<=10m[32ft.]*1	0.3-1.25 mm^2 [AWG22-16] *1
24VDC to AG-150A	n	<=50m[164ft.]	0.75-2.0 mm^2 [AWG18-14]

*1. If the length from ME to Indoor exceed 10m, use 1.25 mm^2 [AWG16] shielded cable, but the total length should be counted into Max. length via Heat source.



OC, OS1, OS2: Heat source unit controller; IC: Indoor unit controller; ME: ME remote controller

2-2. Transmission Cable Specifications

	Transmission cables (Li)	ME Remote controller cables	MA Remote controller cables
Type of cable	Shielding wire (2-core) CVVS, CPEVS or MVVS	Sheathed 2-core cable (unshielded) CVV	
Cable size	More than 1.25mm^2 [AWG16]	0.3～1.25mm^2 [AWG22～16] (0.75～1.25mm^2 [AWG18~16])*1	0.3～1.25mm^2 [AWG22～16] (0.75～1.25mm^2 [AWG18~16])*1
Remarks	—	When 10m [32ft] is exceeded, use cables with the same specification as transmission cables.	Max length : 200m [656ft]

*1 Connected with simple remote controller.

CVVS, MVVS : PVC insulated PVC jacketed shielded control cable
CPEVS : PE insulated PVC jacketed shielded communication cable
CVV : PV insulated PVC sheathed control cable

2-3. System Configuration Restrictions

2-3-1. Common restrictions for the CITY MULTI system

For each Heat source unit, the maximum connectable quantity of Indoor unit is specified at its Specifications table.

A) 1 Group of Indoor units can have 1-16 Indoor units;
B) Maximum 2 remote controllers for 1 Group;
C) 1 LOSSNAY unit can interlock maximum 16 Indoor units; 1 Indoor unit can interlock only 1 LOSSNAY unit.
D) Maximum 3 System controllers are connectable when connecting to TB3 of the Heat source unit.
E) Maximum 3 System controllers are connectable when connecting to TB7 of the Heat source unit, if the transmission power is supplied by the Heat source unit.
F) 4 System controllers or more are connectable when connecting to TB7 of the Heat source unit, if the transmission power is supplied by the power supply unit PAC-SC51KUA. Details refer to 2-3-3-C.
*System controller connected as described in D) and E) would have a risk that the failure of connected Heat source unit would stop power supply to the System controller.

2-3-2. Ensuring proper communication power for M-NET

In order to ensure proper communication among Heat source unit, Indoor unit, LOSSNAY and Controllers, the transmission power situation for the M-NET should be observed. In some cases, Transmission booster should be used. Taking the power consumption index of Indoor unit sized P06-P54 as 1, the equivalent power consumption index and supply capability index of others are listed at Table 2-3-1 and Table 2-3-2.

Table 2-3-1 The equivalent power consumption by index Indoor units, LOSSNAY, controllers

Indoor,OA unit	Indoor unit	BC controller	MA RC.LOSSNAY	ME Remote Contr.	Timers, System Contr.				MN Converter	
Sized P06-P54	Sized P72,P96	CMB	PAR-21MAA PAC-YT51CRB PAR-FA32MA LGH-RX-E PZ-41SLB	PAR-F27MEA PZ-52SF	PAC-SF44SRA PAC-YT34ST AG-150A	GB-50A	TC-24	PAC-YT40ANRA GB-24	CMS-MNF-B	CMS-MNG-E
1	7	2	0	1/4	1/2	3	4	1	1/2	2

*RC : Remote Controller

Table 2-3-2 The equivalent power supply capability index of Trans.Booster, Power supply unit, Connector TB3, TB7 of Heat source unit.

Transmission Booster	Power supply unit	Centralized Controller	Expansion controller	Heat source unit	Heat source unit
PAC-SF46EPA	PAC-SC51KUA	GB-50ADA	PAC-YG50ECA	Connector TB3 and TB7 total *	Connector TB7 only
25	5	6	6	32	6

*If PAC-SC51KUA is used to supply power at TB7 side, no power supply need from Heat source unit at TB7, Connector TB3 itself will therefore have 32.

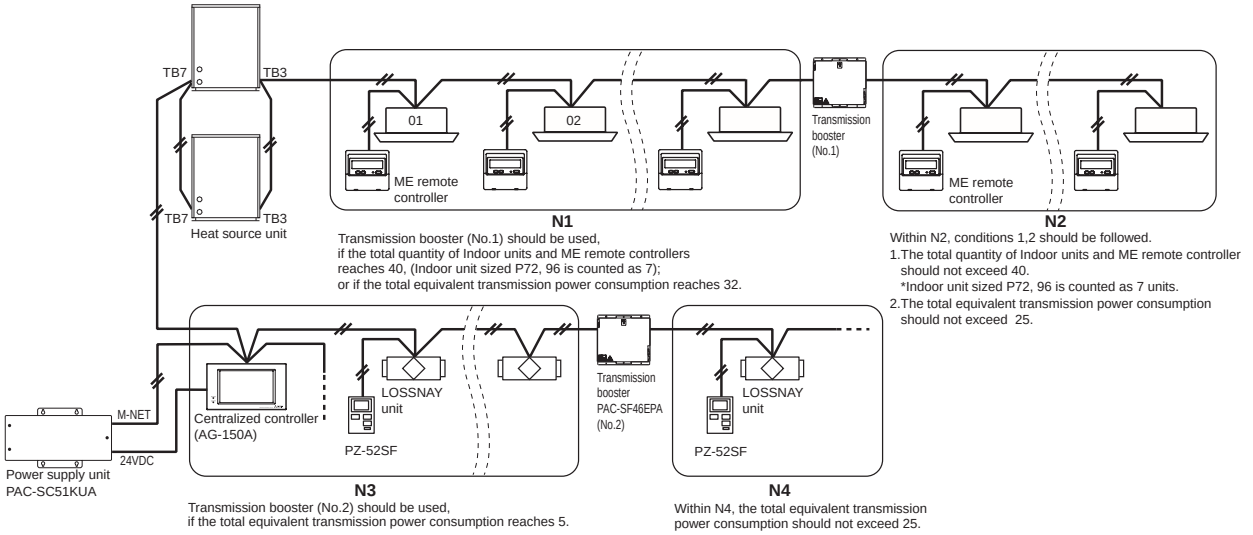
With the equivalent power consumption values in Table 2-3-1 and Table 2-3-2, PAC-SF46EPA can be designed into the air-conditioner system to ensure proper system communication according to 2-3-2-A, B, C.

2-3-2-A) Firstly, count from TB3 at TB3 side the total quantity of Indoor units and ME remote controller, Timers and System controllers.If the total quantity reaches 40, a PAC-SF46EPA should be set.In this case, Indoor unit sized P72, 96 is counted as 7 Indoor units, but MA remote controller(s), LOSSNAY is NOT counted.

2-3-2-B) Secondly, count from TB7 side to TB3 side the total transmission power consumption index. If the total power consumption reaches 32, a PAC-SF46EPA should be set.Yet, if a PAC-SC51KUA is used to supply power at TB7 side, count from index TB3 side only.

2-3-2-C) Thirdly, count from TB7 at TB7 side the total transmission power consumption index, If the total power consumption reaches 6, a PAC-SF46EPA should be set.

■ System example


TB7
TB3
TB7
TB3
Heat source unit
01
02
ME remote controller
Transmission booster (No.1)
ME remote controller
N1
Transmission booster (No.1) should be used, if the total quantity of Indoor units and ME remote controllers reaches 40, (Indoor unit sized P72, 96 is counted as 7); or if the total equivalent transmission power consumption reaches 32.
N2
Within N2, conditions 1,2 should be followed.
1.The total quantity of Indoor units and ME remote controller should not exceed 40.
*Indoor unit sized P72, 96 is counted as 7 units.
2.The total equivalent transmission power consumption should not exceed 25.
M-NET
24VDC
Power supply unit
PAC-SC51KUA
Centralized controller
(AG-150A)
LOSSNAY unit
PZ-52SF
Transmission booster
PAC-SF46EPA
(No.2)
LOSSNAY unit
PZ-52SF
N3
Transmission booster (No.2) should be used, if the total equivalent transmission power consumption reaches 5.
N4
Within N4, the total equivalent transmission power consumption should not exceed 25.

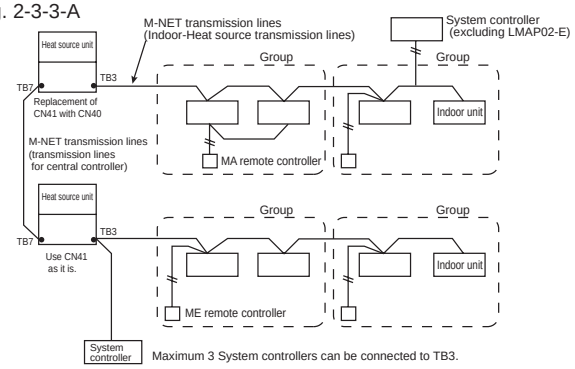
2-3-3. Ensuring proper power supply to System controller

The power to System controller (excluding LMAP03-U) is supplied via M-NET transmission line. M-NET transmission line at TB7 side is called Central control transmission line while one at TB3 side is called Indoor-Heat source transmission line. There are 3 ways to supply power to the System controller .
A) Connecting to TB3 of the Heat source unit and receiving power from the Heat source unit.
B) Connecting to TB7 of the Heat source unit and receiving power from the Heat source unit.
C) Connecting to TB7 of the Heat source unit but receiving power from power supply unit PAC-SC51KUA.

2-3-3-A. When connecting to TB3 of the Heat source unit and receiving power from the Heat source unit.

Maximum 3 System controllers can be connected to TB3.
If there is more than 1 Heat source unit, it is necessary to replace power supply switch connector CN41 with CN40 on one Heat source unit.

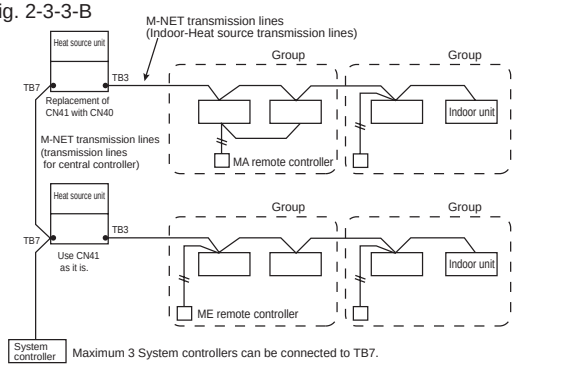
Fig. 2-3-3-A



2-3-3-B. When connecting to TB7 of the Heat source unit and receiving power from the Heat source unit.

Maximum 3 System controllers can be connected to TB7 and receiving power from the Heat source unit.
It is necessary to replace power supply switch connector CN41 with CN40 on one Heat source unit.

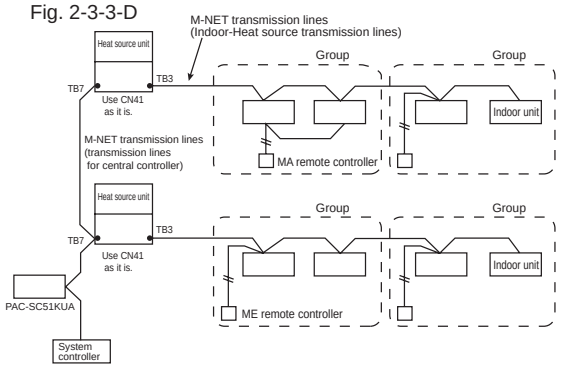
Fig. 2-3-3-B



2-3-3-C. When connecting to TB7 of the Heat source unit but receiving power from PAC-SC51KUA.

When using PAC-SC51KUA to supply transmission power, the power supply connector CN41 on the Heat source units should be kept as it is. It is also a factory setting.
1 PAC-SC51KUA supports maximum 1 AG-150A unit due to the limited power DC 24V at its TB3.
However, 1 PAC-SC51KUA supplies transmission power at its TB2 equal to 5 Indoor units, which is referable at Table 2-3-2.
If PZ-52SF, Timers, System controller, ON/OFF controller connected to TB7 consume transmission power more than 5 (Indoor units), Transmission booster PAC-SF46EPA is needed. PAC-SF46EPA supplies transmission power equal to 25 Indoor units.

Fig. 2-3-3-D



⚠ CAUTION

AG-150A/GB-50A/GB-50ADA/GB-24A/TC-24A is recommended to connect to TB7 because these controllers perform back-up to a number of data.
In an air conditioner system has more than 1 Heat source units, AG-150A/GB-50A/GB-50ADA/GB-24A/TC-24A receiving transmission power at TB3 or TB7 on one of the Heat source units would have a risk that the connected Heat source unit failure would stop power supply to AG-150A/GB-50A/GB-50ADA/GB-24A/TC-24A, and disrupt the whole system. When applying apportioned electric power function, AG-150A/GB-50A/GB-24A/TC-24A is necessary to connected to TB7 and has its own power supply unit PAC-SC51KUA.* *Power supply unit PAC-SC51KUA is for AG-150A.

2-3-4. Power supply to LM adapter LMAP03U

1-phase 208-230V AC power supply is needed.
The power supply unit is not necessary when connecting only the LMAP03U. Yet, make sure to change the power supply changeover connector CN41 to CN40 on the LM adapter.

2-3-5. Power supply to expansion controller

1-phase 100-240VAC power supply is needed.
The power supply unit PAC-SC51KUA is not necessary.
The expansion controller supplies power through TB3, which equals 6 indoor units. (refer to Table 2-3-2)

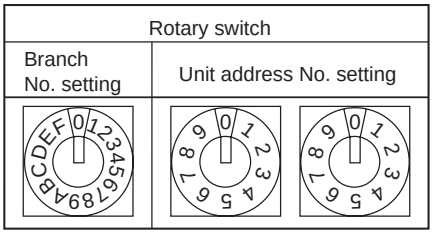
2-3-6. Power supply to BM ADAPTER

1-phase 100-240VAC power supply is needed.
The power supply unit PAC-SC51KUA is not necessary when only BM ADAPTER is connected.
Yet, make sure to move the power jumper from CN41 to CN40 on the BM ADAPTER.

2-4. Address Setting

2-4-1. Switch operation

In order to constitute CITY MULTI in a complete system, switch operation for setting the unit address No. and connection No. is required.



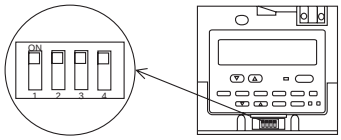
① Address No. of heat source unit, indoor unit and remote controller.
The address No. is set at the address setting board.
In the case of WR2 system, it is necessary to set the same No. at the branch No. switch of indoor unit as that of the BC controller connected. (When connecting two or more branches, use the lowest branch No.)

② Caution for switch operations

- Be sure to shut off power source before switch setting. If operated with power source on, switch can not operate properly.
- No units with identical unit address shall exist in one whole air conditioner system. If set erroneously, the system can not operate.

③ MA remote controller

- When connecting only one remote controller to one group, it is always the main remote controller.
  When connecting two remote controllers to one group, set one remote controller as the main remote controller and the other as the sub remote controller.
- The factory setting is "Main".



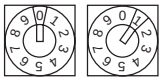
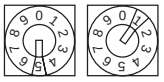
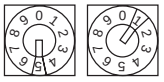
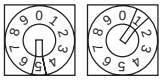
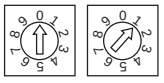
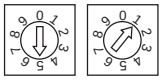
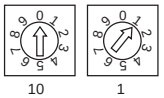
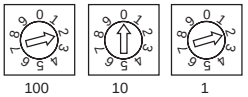
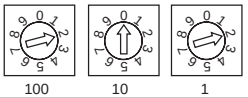
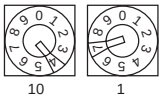
Setting the dip switches

The dip switches are at the bottom of the remote controller.
Remote controller Main/Sub and other function settings are performed using these switches.
Ordinarily, only change the Main/Sub setting of SW1. (The factory settings are all "ON".)

SW No	SW contents Main	ON	OFF	Comment
1	Remote controller Main/Sub setting	Main	Sub	Set one of the two remote controllers at one group to "Main".
2	When remote controller power turned on	Normally on	Timer mode on	When you want to return to the timer mode when the power is restored after a power failure when a Program timer is connected, select "Timer mode".
3	Cooling/heating display in AUTO mode	Yes	No	When you do not want to display "Cooling" and "Heating" in the Auto mode, set to "No".
4	Intake temperature display	Yes	No	When you do not want to display the intake temperature, set to "No".

2. M-NET CONTROL

2-4-2. Rule of setting address

Unit		Address setting	Example	Note
Indoor unit, Lossnay, PAC-YG63MCA (AI Controller), PAC-YG66DCA (DIDO Controller)		01 ~ 50	 10 1	Use the most recent address within the same group of indoor units. Make the indoor units address connected to the BC controller (Sub) larger than the indoor units address connected to the BC controller (Main). If applicable, set the sub BC controllers in an PQRY system in the following order: (1) Indoor unit to be connected to the BC controller (Main) (2) Indoor unit to be connected to the BC controller (No.1 Sub) (3) Indoor unit to be connected to the BC controller (No.2 Sub) Set the address so that (1)<(2)<(3)
Heat source unit		51 ~ 99, 100 (Note1)	 10 1	The smallest address of indoor unit in same refrigerant system + 50 Assign sequential address numbers to the heat source units in one refrigerant circuit system. OC and OS are automatically detected. (Note 2) * Please reset one of them to an address between 51 and 99 when two addresses overlap. * The address automatically becomes "100" if it is set as "01~ 50"
BC controller (Main)		52 ~ 99, 100	 10 1	The address of heat source unit + 1 * Please reset one of them to an address between 51 and 99 when two addresses overlap. * The address automatically becomes "100" if it is set as "01~ 50"
BC controller (Sub)		52 ~ 99, 100	 10 1	Lowest address within the indoor units connected to the BC controller (Sub) plus 50.
Local remote controller	ME, LOSSNAY Remote controller (Main)	101 ~ 150	1 Fixed  10 1	The smallest address of indoor unit in the group + 100 * The place of "100" is fixed to "1"
	ME, LOSSNAY Remote controller (Sub)	151 ~ 199, 200	1 Fixed  10 1	The address of main remote controller + 50 * The address automatically becomes "200" if it is set as "00"
System controller	Group remote controller	201 ~ 250	2 Fixed  10 1	The smallest group No. to be managed + 200
	System remote controller	000, 201 ~ 250	 100 10 1	
	ON/OFF remote controller	000, 201 ~ 250	 100 10 1	
	GB-50ADA, AG-150A, GB-50A, GB-24A/TC-24A	000, 201 ~ 250	0 0 0 100 10 1	
	PAC-YG50ECA	000, 201 ~ 250	0 0 0 100 10 1	* Settings are made on the initial screen of AG-150A.
	BAC-HD150	000, 201 ~ 250	0 0 0 100 10 1	* Settings are made with setting tool of BM ADAPTER.
	LMAP03U	201 ~ 250	2 Fixed  10 1	

Note1: To set the address to "100", set it to "50"
Note2: Heat source units OC, OS1 and OS2 in one refrigerant circuit system are automatically detected.
OC, OS1 and OS2 are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.

2-4-3. System examples

Factory setting

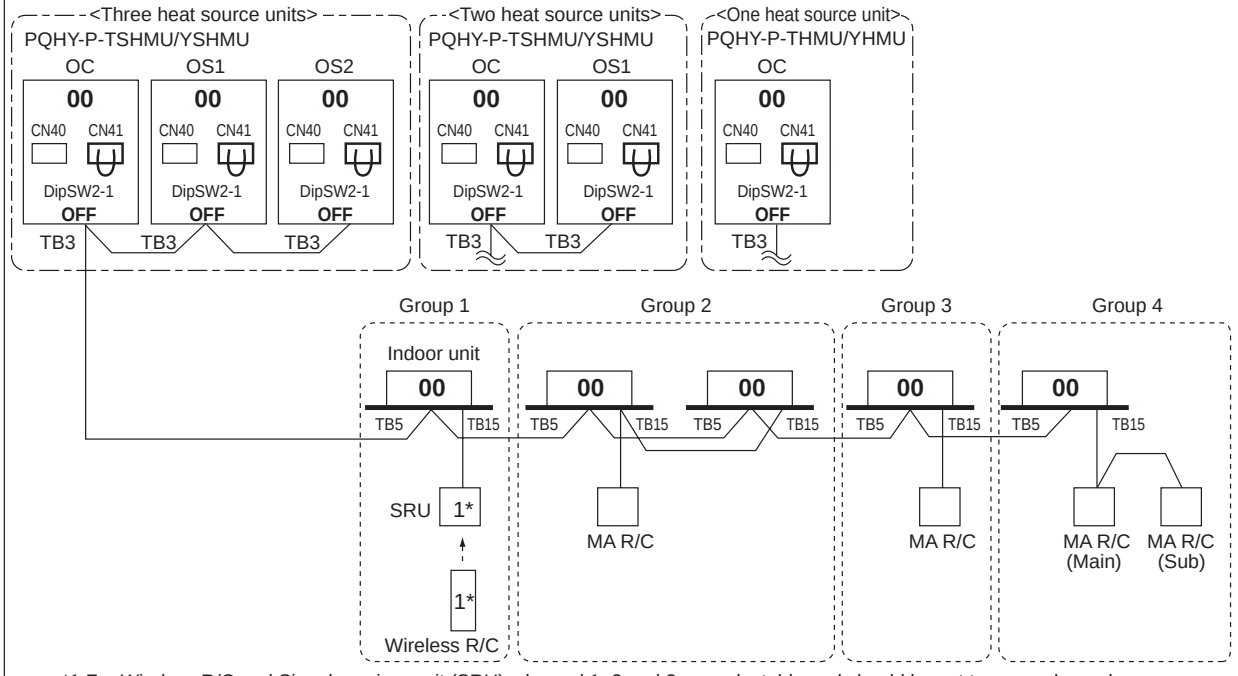
Original switch setting of the heat sources, indoors, controllers and LMAP at shipment is as follows.

- •Heat source unit : Address: 00, CN41: U (Jumper), DipSW2-1: OFF
- •Indoor unit : Address: 00
- •ME remote controller : Address: 101
- •LMAP : Address: 247, CN41: U (Jumper), DipSW1-2: OFF

Setting at the site

- •DipSW2-1(Heat source) : When the System Controller is used, all the Dip SW2-1 at the heat source units should be set to "ON". * Dip SW2-1 remains OFF when only LMAP03U is used.
- •DipSW1-2(LMAP) : When the LMAP is used together with System Controller, DipSW1-2 at the LMAP should be set to "ON".
- •CN40/CN41 : Change jumper from CN41 to CN 40 at heat source control board will activate central transmission power supply to TB7;
  (Change jumper at only one heat source unit when activating the transmission power supply without using a power supply unit.)
  Change jumper from CN41 to CN 40 at LMAP will activate transmission power supply to LMAP itself;
  Power supply unit is recommended to use for a system having more than 1 heat source unit, because the central transmission power supply from TB7 of one of heat source units is risking that the heat source unit failure may let down the whole system controller system.

2-4-3-1. MA remote controller, Single-refrigerant-system, No System Controller



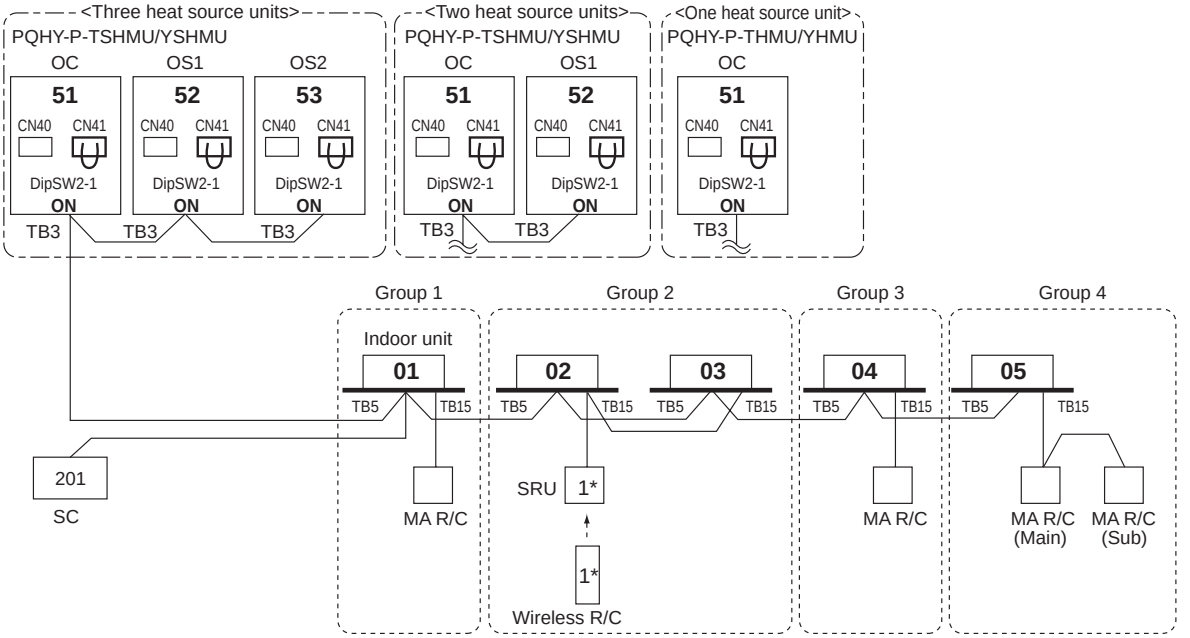
*1 For Wireless R/C and Signal receiver unit (SRU), channel 1, 2 and 3 are selectable and should be set to same channel.

NOTE:

1. Heat source units OC, OS1 and OS2 in one refrigerant circuit system are automatically detected.
   OC, OS1 and OS2 are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.
2. No address setting is needed.
3. For a system having more than 32 indoor unit (P06-P54), confirm the need of Booster at **2-3 "System configuration restrictions".**

2. M-NET CONTROL

2-4-3-2. MA remote controller, Single-refrigerant-system, System Controller



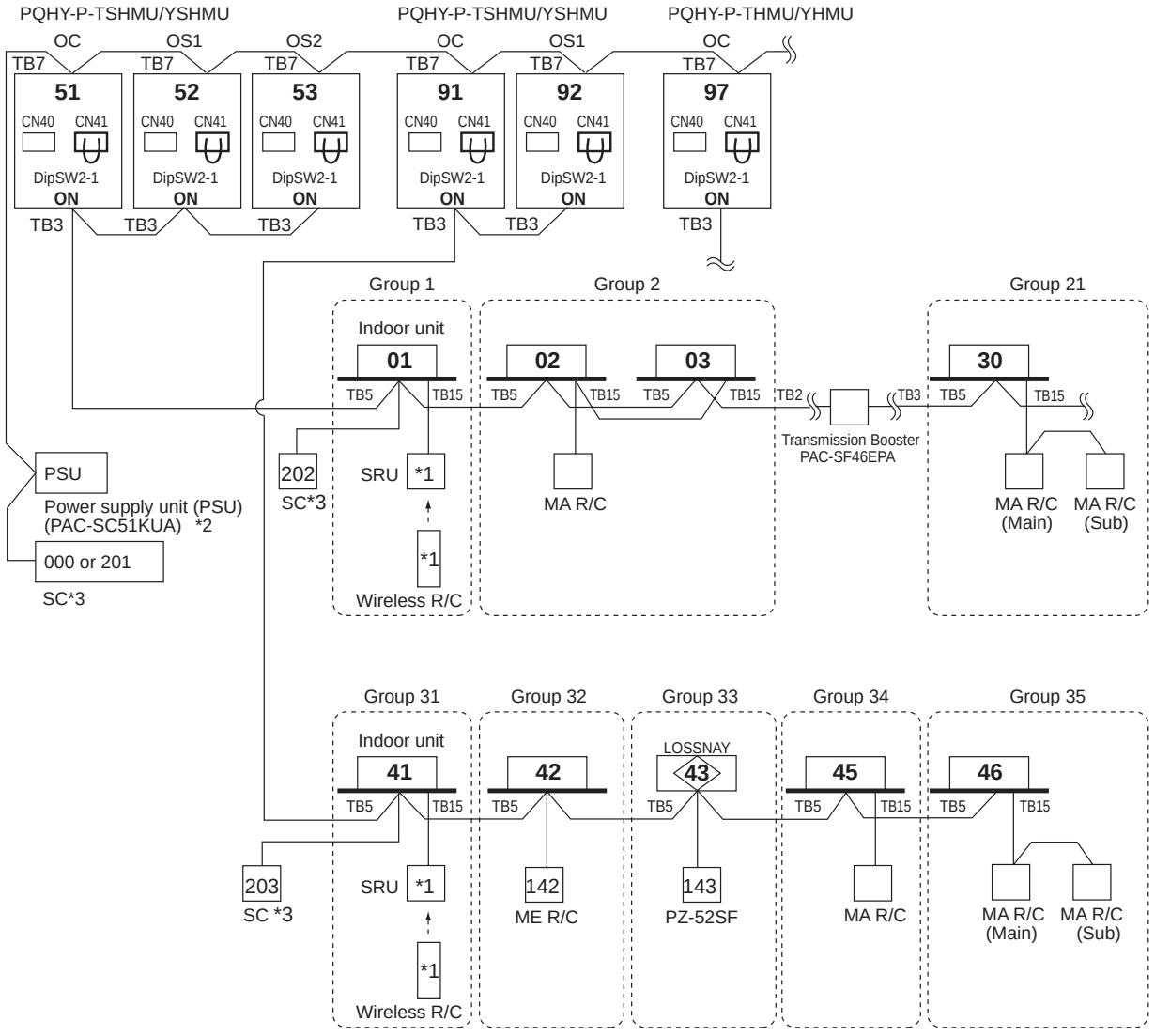
*1 For Wireless R/C and Signal receiver unit (SRU), channel 1, 2 and 3 are selectable and should be set to same channel.

*SC can be connected to TB3 side or TB7 side;
Should SC connected to TB7 side, change Jumper from CN41 to CN40 at the Heat source unit module so as to supply power to the SC.

NOTE:

1. Heat source units OC, OS1 and OS2 in one refrigerant circuit system are automatically detected.
   OC, OS1 and OS2 are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.
2. Address should be set to Indoor units and central controller.
3. For a system having more than 32 indoor unit (P06-P54), confirm the need of Booster at **2-3 "System configuration restrictions".**

2-4-3-3. MA remote controller, Multi-refrigerant-system, System Controller at TB7/TB3 side, Booster for long M-NET wiring



*1 For Wireless R/C and Signal receiver unit (SRU), channel 1, 2 and 3 are selectable and should be set to same channel.

*2 System controller should connect to TB7 at the Heat source unit and use power supply unit together in Multi-Refrigerant-System. For AG-150A, 24V DC should be used with the PAC-SC51KUA.

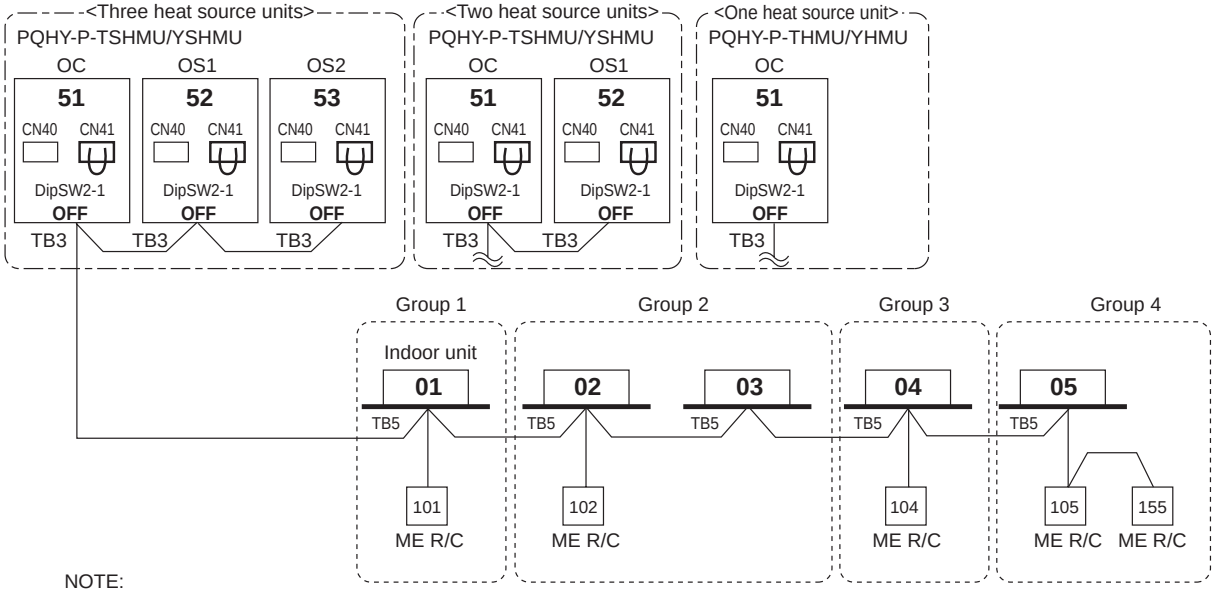
*3 When multiple system controllers are connected in the system, set the controller with more functions than others as a "main" controller and others as "sub".
Make the setting to only one of the system controllers for "prohibition of operation from local remote controller".

NOTE:

1. Heat source units OC, OS1 and OS2 in one refrigerant circuit system are automatically detected.
   OC, OS1 and OS2 are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.
2. Address should be set to Indoor units, LOSSNAY and system controller.
3. M-NET power is supplied by the Heat source unit at TB3, while Indoor unit and ME remote controller consume the M-NET power for transmission use. The power balance is needed to consider for long M-NET wiring. Details refer to **2-3 "System configuration restrictions".**

2. M-NET CONTROL

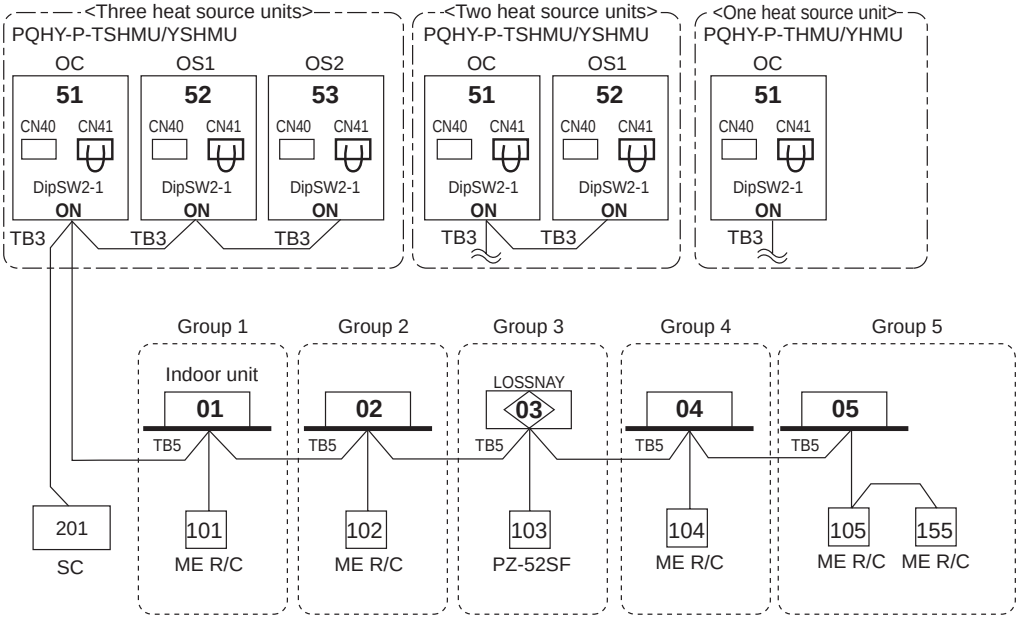
2-4-3-4. ME remote controller, Single-refrigerant-system, No system controller



NOTE:

1. Heat source units OC, OS1 and OS2 in one refrigerant circuit system are automatically detected.
   OC, OS1 and OS2 are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.
2. Address should be set to Indoor units, system controller and ME remote controllers.
3. M-NET power is supplied by the Heat source unit at TB3, while Indoor unit and ME RC consume the M-NET power for transmission use. The power balance is needed to consider for long M-NET wiring. Details refer to **2-3 "System configuration restrictions".**

2-4-3-5. ME remote controller, Single-refrigerant-system, System controller, LOSSNAY

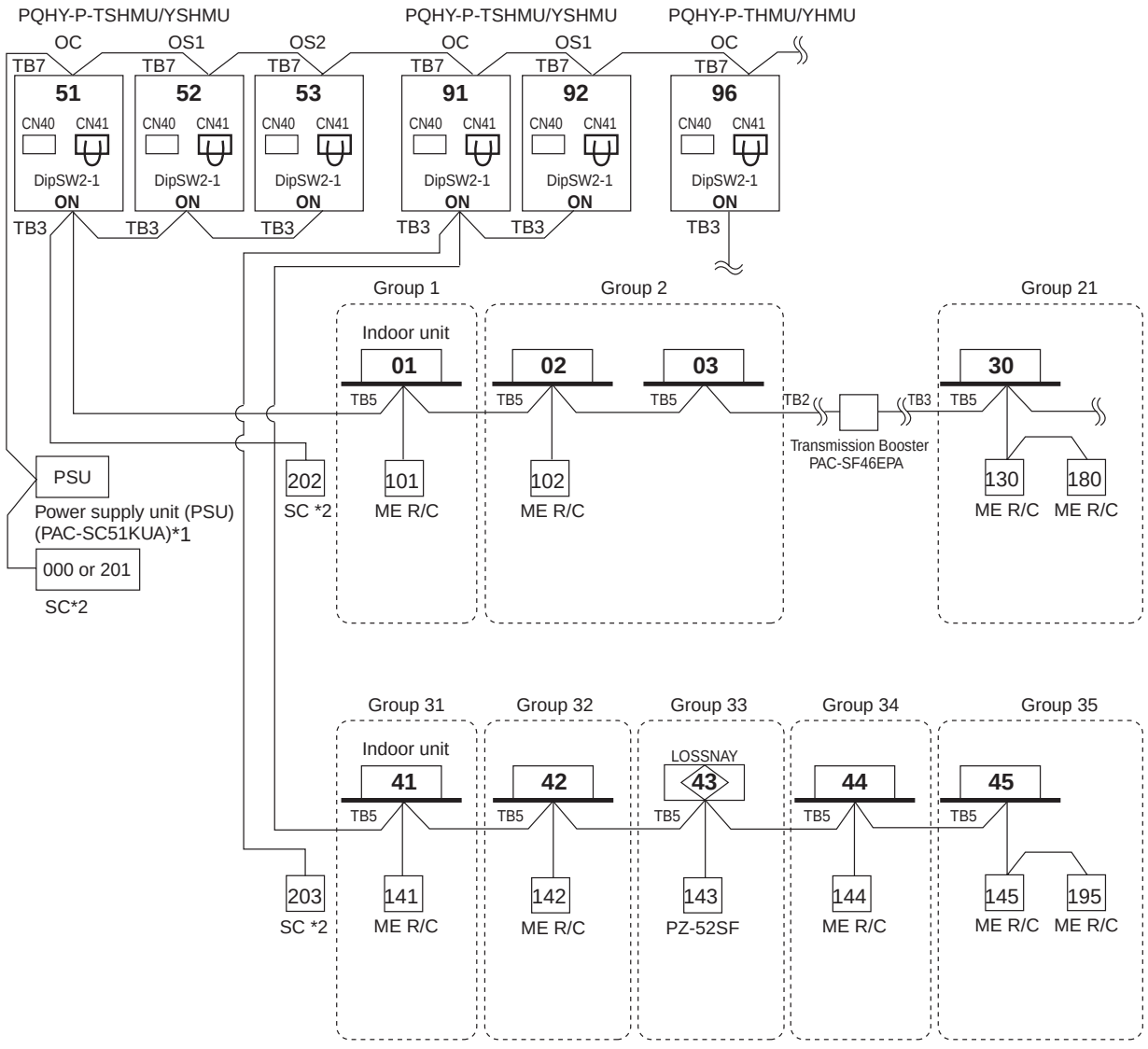


*SC can be connected to TB3 side or TB7 side;
Should SC connected to TB7 side, change Jumper from CN41 to CN40 at the Heat source unit module so as to supply power to the SC.

NOTE:

1. Heat source units OC, OS1 and OS2 in one refrigerant circuit system are automatically detected.
   OC, OS1 and OS2 are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.
2. Address should be set to Indoor units, LOSSNAY central controller, ME remote controllers.
3. For a system having more than 32 indoor unit (P06-P54), confirm the need of Booster at **2-3 "System configuration restrictions".**

2-4-3-6. ME remote controller, Multi-refrigerant-system, System Controller at TB 7side, LOSSNAY, Booster for long M-NET wiring



*1 System controller should connect to TB7 at the Heat source unit and use power supply unit together in Multi-Refrigerant-System. For AG-150A, 24V DC should be used with the PAC-SC51KUA.

*2 When multiple system controllers are connected in the system, set the controller with more functions than others as a "main" controller and others as "sub".
Make the setting to only one of the system controllers for "prohibition of operation from local remote controller".

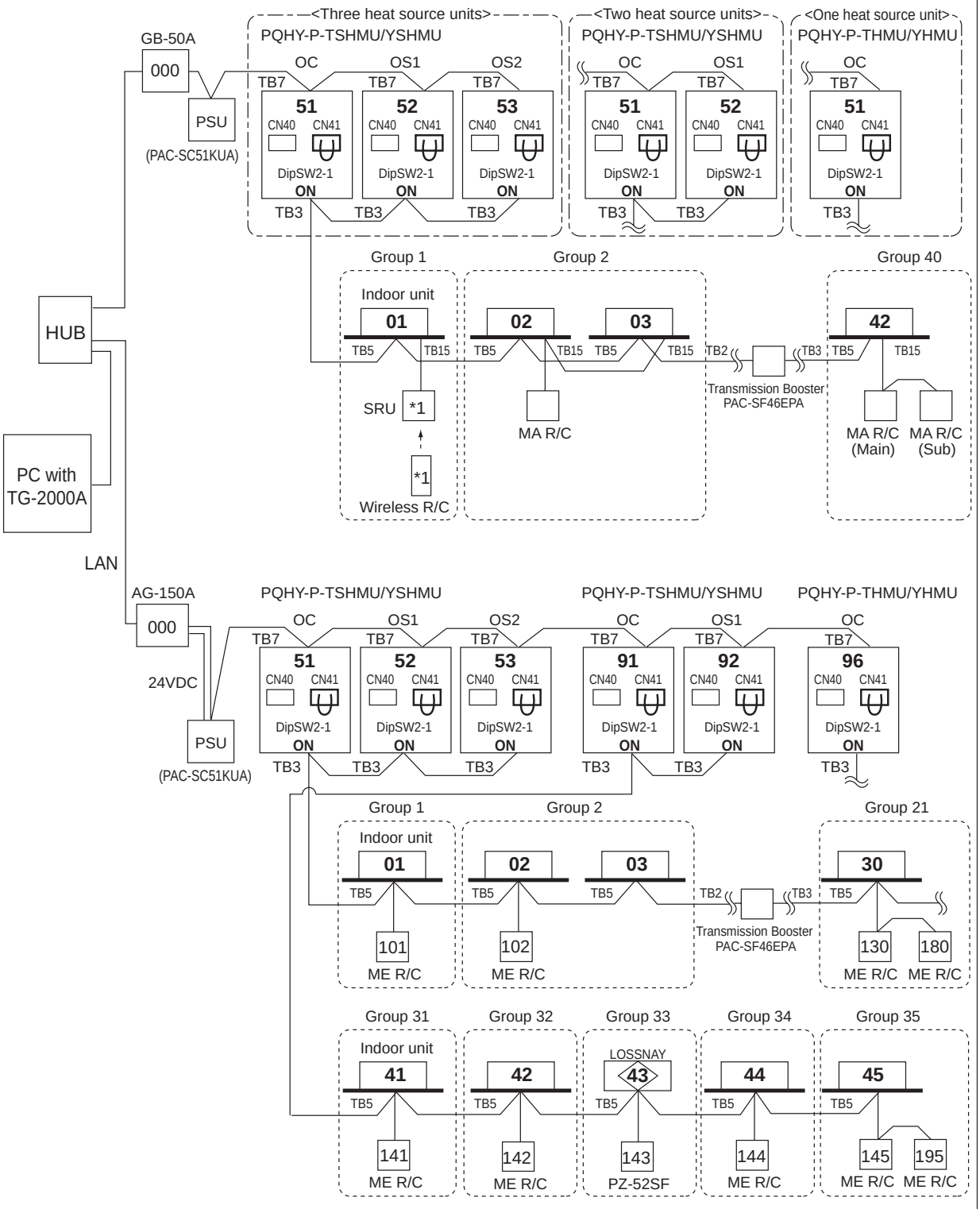
NOTE:

1. Heat source units OC, OS1 and OS2 in one refrigerant circuit system are automatically detected.
   OC, OS1 and OS2 are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.
2. M-NET power is supplied by the Heat source unit at TB3, while Indoor unit and ME remote controller consume the M-NET power for transmission use. The power balance is needed to consider for long M-NET wiring. Details refer to **2-3 "System configuration restrictions".**

2. M-NET CONTROL

2-4-3-7. TG-2000A+ AG-150A /GB-50A

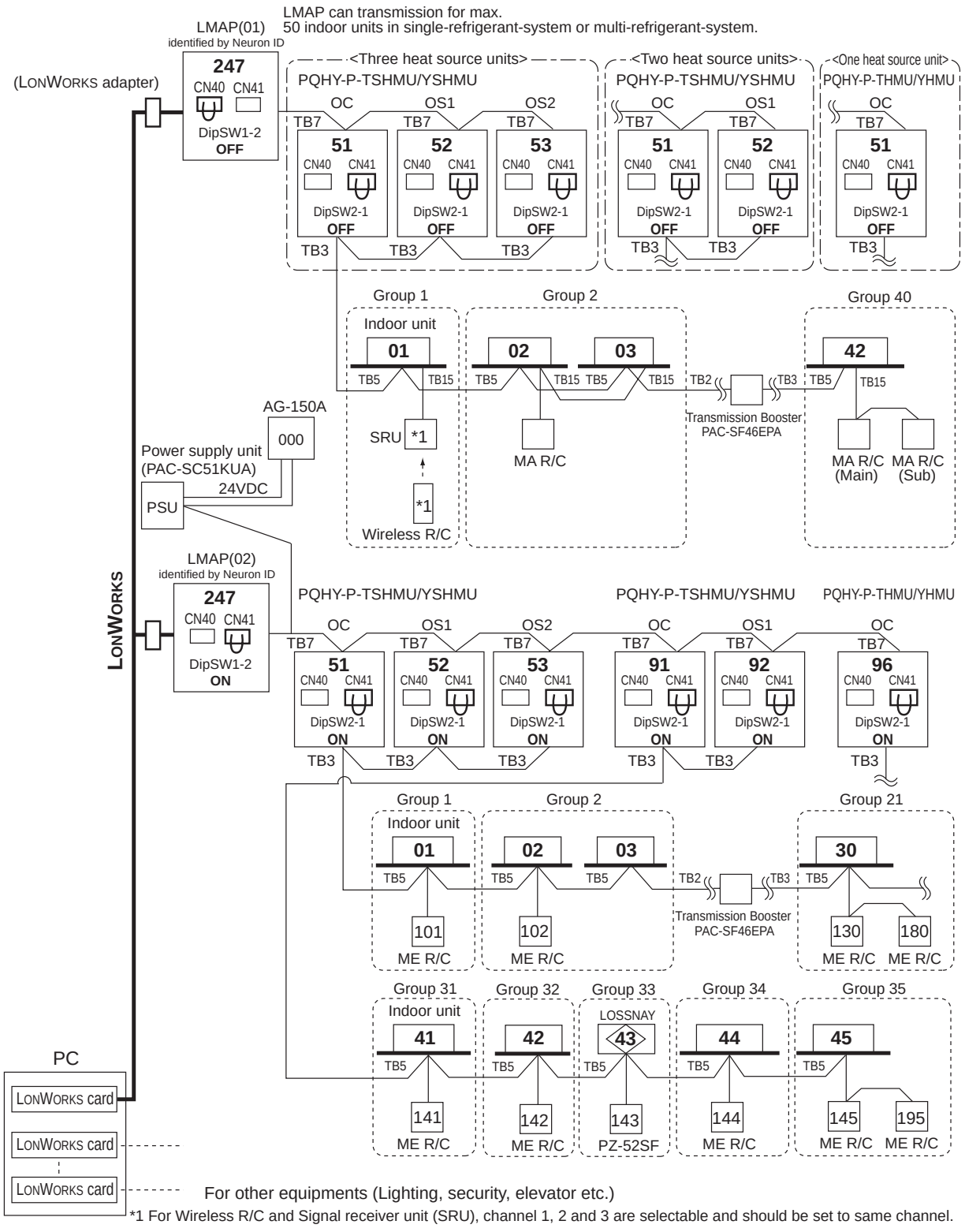
AG-150A/GB-50A can control max. 50 indoor units;
TG-2000A can control max. 40 pieces of AG-150A*2 or GB-50A;
TG-2000A can control max. 2000 indoor units.



*1 For Wireless R/C and Signal receiver unit (SRU), channel 1, 2 and 3 are selectable and should be set to same channel.
*2 Only AG-150As that are not connected to expansion controllers.

2-4-3-8. LMAP

LMAP can transmission for max. 50 indoor units;
If system controller (SC) is used, DipSW1-2 at LMAP and DipSW2-1 at Heat source unit should set to "ON".
Change Jumper from CN41 to CN40 to activate power supply to LMAP itself for those LMAP connected without system controller (SC).

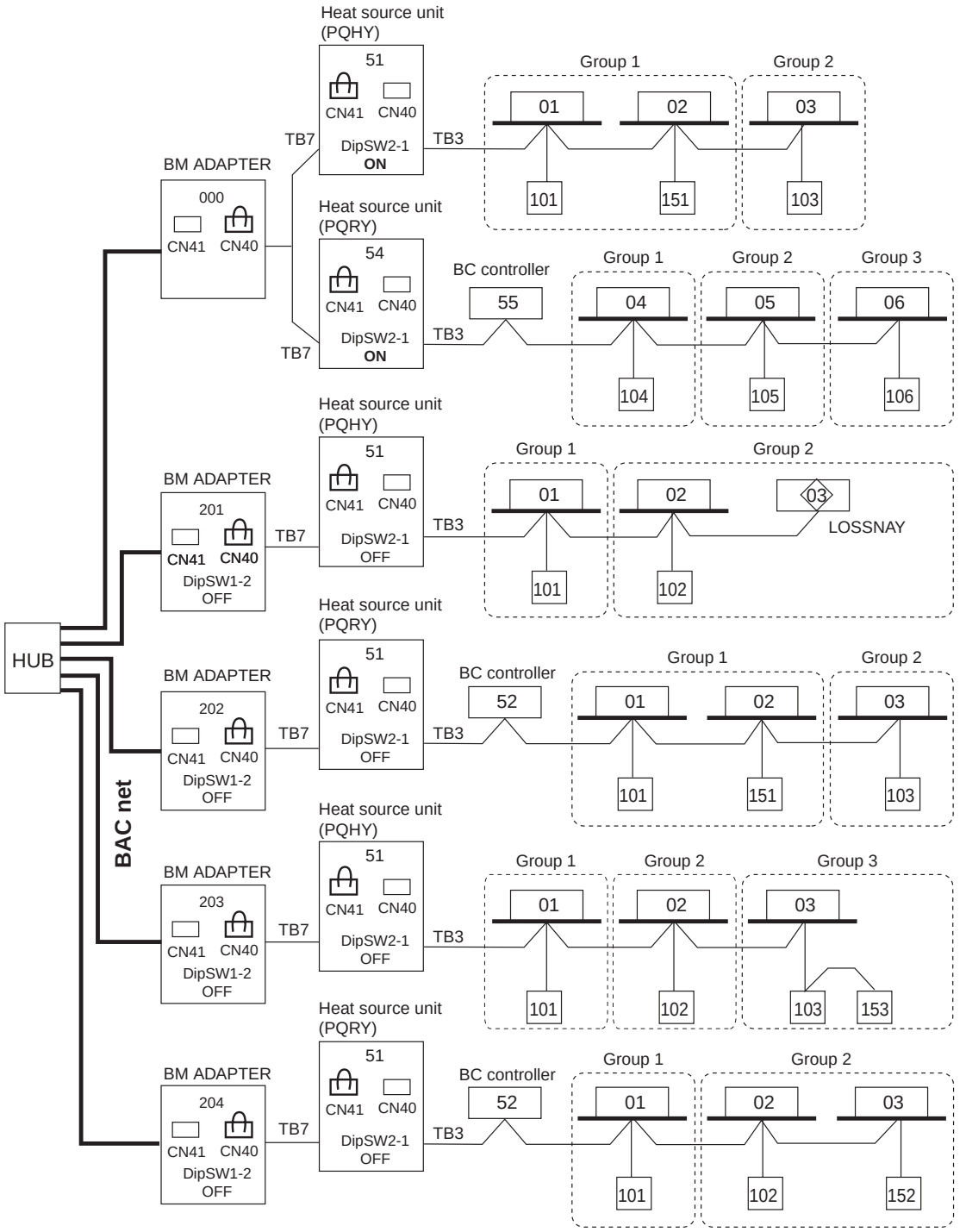


*1 For Wireless R/C and Signal receiver unit (SRU), channel 1, 2 and 3 are selectable and should be set to same channel.

2. M-NET CONTROL

2-4-3-9. BM ADAPTER

BM ADAPTER can transmission for max. 50 indoor units;
Change Jumper from CN41 to CN40 to activate power supply to BM ADAPTER itself for those BM ADAPTER connected without the power supply unit.



3-1. R410A Piping Material

Refrigerant pipe for CITY MULTI shall be made of phosphorus deoxidized copper, and has two types.
A. Type-O : Soft copper pipe (annealed copper pipe), can be easily bent with human's hand.
B. Type-1/2H pipe : Hard copper pipe (Straight pipe), being stronger than Type-O pipe of the same radical thickness.

The maximum operation pressure of R410A air conditioner is 4.30 MPa [623psi]. The refrigerant piping should ensure the safety under the maximum operation pressure. MITSUBISHI ELECTRIC recommends pipe size as Table 3-1, or You shall follow the local industrial standard. Pipes of radical thickness 0.7mm or less shall not be used.

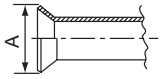
Table 3-1. Copper pipe size and radial thickness for R410A CITY MULTI.

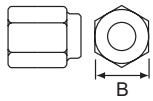
Size (mm)	Size (inch)	Radial thickness (mm)	Radial thickness (mil)	Pipe type
ø6.35	ø1/4"	0.8	[32]	Type-O
ø9.52	ø3/8"	0.8	[32]	Type-O
ø12.7	ø1/2"	0.8	[32]	Type-O
ø15.88	ø5/8"	1.0	[40]	Type-O
ø19.05	ø3/4"	1.2	[48]	Type-O
ø19.05	ø3/4"	1.0	[40]	Type-1/2H or H
ø22.2	ø7/8"	1.0	[40]	Type-1/2H or H
ø25.4	ø1"	1.0	[40]	Type-1/2H or H
ø28.58	ø1-1/8"	1.0	[40]	Type-1/2H or H
ø31.75	ø1-1/4"	1.1	[44]	Type-1/2H or H
ø34.93	ø1-3/8"	1.2	[48]	Type-1/2H or H
ø41.28	ø1-5/8"	1.4	[56]	Type-1/2H or H

* For pipe sized ø19.05 (3/4") for R410A air conditioner, choice of pipe type is up to you.
* The figures in the radial thickness column are based on the Japanese standards and provided only as a reference. Use pipes that meet the local standards.

Flare

Due to the relative higher operation pressure of R410A compared to R22, the flare connection should follow dimensions mentioned below so as to achieve enough the air-tightness.

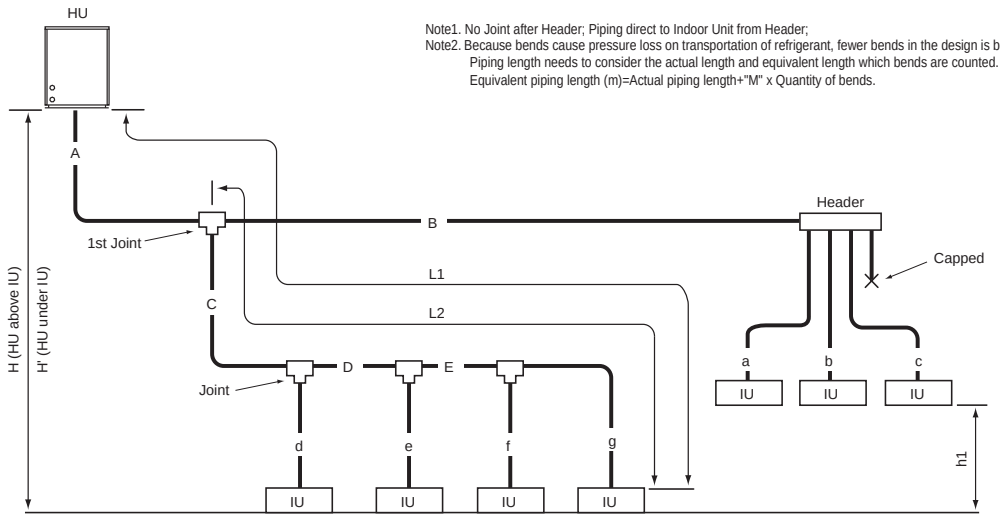
Flare pipe	Pipe size	A (For R410A) (mm[in.])
	ø6.35 [1/4"]	9.1
	ø9.52 [3/8"]	13.2
	ø12.70 [1/2"]	16.6
	ø15.88 [5/8"]	19.7
	ø19.05 [3/4"]	24.0

Flare nut	Pipe size	B (For R410A) (mm[in.])
	ø6.35 [1/4"]	17.0
	ø9.52 [3/8"]	22.0
	ø12.70 [1/2"]	26.0
	ø15.88 [5/8"]	29.0
	ø19.05 [3/4"]	36.0

3. PIPING DESIGN

3-2. Piping Design

3-2-1. PQHY-P72-120THMU/YHMU Piping



Note1. No Joint after Header; Piping direct to Indoor Unit from Header;
Note2. Because bends cause pressure loss on transportation of refrigerant, fewer bends in the design is better;
Piping length needs to consider the actual length and equivalent length which bends are counted.
Equivalent piping length (m)=Actual piping length+"M" x Quantity of bends.

Fig. 3-2-1A Piping scheme

IU : Indoor unit , HU : Heat source unit

Table3-2-1-1. Piping length **(m [ft.])**

Item	Piping in the figure	Max. length	Max. equivalent length
Total piping length	A+B+C+D+E+a+b+c+d+e+f+g	300 [984]	-
Farthest IU from HU (L1)	A+C+D+E+g / A+B+c	165 [541]	190 [623]
Farthest IU from first Joint (L2)	C+D+E+g / B+c	40 [131]*	40 [131]
Height between HU and IU (HU above IU)	H	50 [164]	-
Height between HU and IU (HU under IU)	H'	40 [131]	-
Height between IU and IU	h1	15 [49]	-

HU: Heat source Unit, IU: Indoor Unit

*1 See note on next page.

Table3-2-1-2. Bent equivalent length "M"

Heat source Model	M (m/bends [ft./bends])
PQHY-P72T/YHMU	0.35 [1.15]
PQHY-P96T/YHMU	0.42 [1.38]
PQHY-P120T/YHMU	0.42 [1.38]

Table3-2-1-3. Piping "A" size selection rule **(mm [in.])**

Heat source and the first Joint	Pipe(Liquid)	Pipe(Gas)
PQHY-P72T/YHMU=CMY-Y102S-G2	ø9.52 [3/8]	ø19.05 [3/4]
PQHY-P96T/YHMU=CMY-Y102S/L-G2	ø9.52 [3/8] *1	ø22.20 [7/8]
PQHY-P120T/YHMU=CMY-Y102S/L-G2	ø9.52 [3/8] *2	ø22.20 [7/8]

*1.A>=90m [295ft.], ø12.70mm [1/2in.] ;
*2.A>=40m [131ft.], ø12.70mm [1/2in.]

Table3-2-1-6. R410A Joint selection rule

Total down-stream Indoor capacity	Joint
~ P72	CMY-Y102S-G2
P73 ~ P144	CMY-Y102L-G2
P145 ~ P240	CMY-Y202-G2
P241 ~	CMY-Y302-G2

*Concerning detailed usage of Joint parts, refer to its Installation Manual.

Table3-2-1-4. Piping"B","C","D","E"size selection rule **(mm [in.])**

Total down-stream Indoor capacity	Pipe(Liquid)	Pipe(Gas)
~ P54	ø9.52 [3/8]	ø15.88 [5/8]
P55 ~ P72	ø9.52 [3/8]	ø19.05 [3/4]
P73 ~ P108	ø9.52 [3/8]	ø22.20 [7/8]
P109 ~ P144	ø12.70 [1/2]	ø28.58 [1-1/8]
P145 ~ P240	ø15.88 [5/8]	ø28.58 [1-1/8]
P241 ~ P308	ø19.05 [3/4]	ø34.93 [1-3/8]
P309 ~	ø19.05 [3/4]	ø41.28 [1-5/8]

Table3-2-1-5. Piping "a","b","c","d","e","f","g" size selection rule **(mm [in.])**

Indoor Unit size	Pipe(Liquid)	Pipe(Gas)
P06,P08,P12,P15,P18	ø6.35 [1/4]	ø12.70 [1/2]
P27,P30,P36,P48,P54	ø9.52 [3/8]	ø15.88 [5/8]
P72	ø9.52 [3/8]	ø19.05 [3/4]
P96	ø9.52 [3/8]	ø22.20 [7/8]

Table3-2-1-7. R410A Header selection rule

	4-branch Header	8-branch Header	10-branch Header
	CMY-Y104-G	CMY-Y108-G	CMY-Y1010-G
Total down-stream Indoor capacity	<=P72	<=P144	<=P240

* CMY-Y104-G can directly connect PQHY-P72T/YHMU, but can NOT directly connect PQHY-P96T/YHMU or above;
* CMY-Y108-G can directly connect PQHY-P72~168T/Y(S)HMU, but can NOT directly connect PQHY-P192T/YSHMU or above;
* CMY-Y1010-G can directly connect PQHY-P72~240T/Y(S)HMU;
* CMY-Y104-G can NOT connect P72~P96 Indoor, but CMY-Y108,Y1010-G can do;
* Concerning detailed usage of Header parts, refer to its Installation Manual.

Note3. Indoor capacity is described as its model size;
For example, PEFY-P06NMAU-E, its capacity is P06;
Note4. Total down-stream Indoor capacity is the summary of the model size of Indoors downstream.
For example, PEFY-P06NMAU-E+PEFY-P08NMAU-E: Total Indoor capacity=P06+P08=P14
Note5. Piping sized determined by the Total down-stream indoor capacity is NOT necessary
to be bigger than the up-stream one.
i.e. A>=B; A>=C>=D

3-2-2. PQHY-P144-240TSHMU/YSHMU Piping

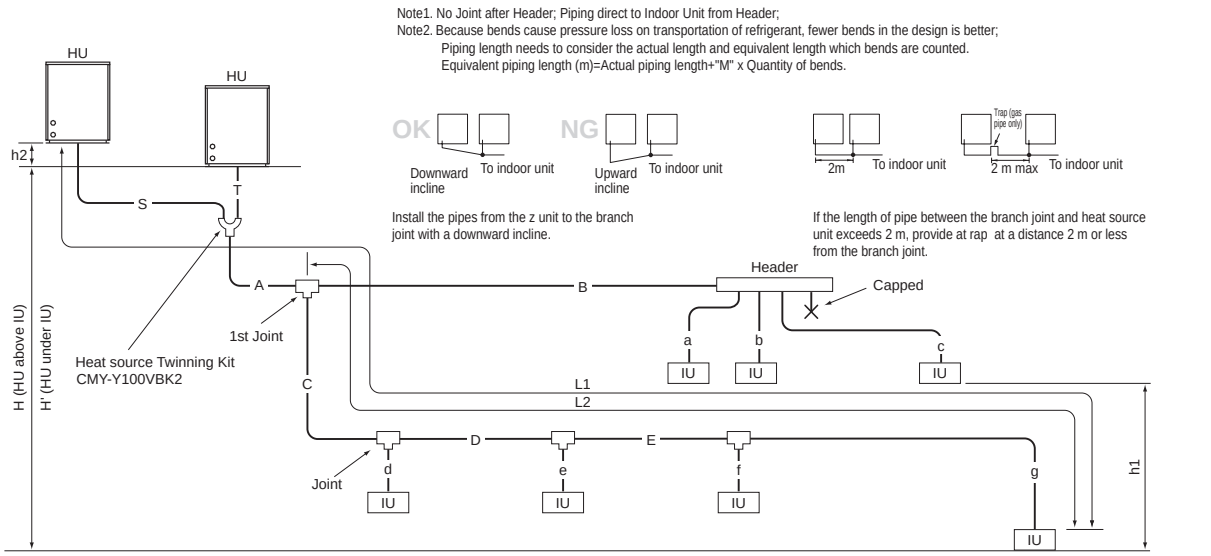


Fig. 3-2-1B Piping scheme

IU : Indoor unit , HU : Heat source unit

Table3-2-2-1. Piping length **(m [ft.])**

Item	Piping in the figure	Max. length	Max. equivalent length
Total piping length	S+T+A+B+C+D+E+a+b+c+d+e+f+g	500 [1640]	-
Distance between HU and HU	S+T	10[32]	-
Height between HU and HU	h2	0.1[0.3]	-
Farthest IU from HU (L1)	S(T)+A+C+D+E+g / S(T)+A+B+c	165 [541]	190 [623]
Farthest IU from the first Joint (L2)	C+D+E+g / B+c	40 [131] *1	40 [131]
Height between HU and IU (HU above IU)	H	50 [164]	-
Height between HU and IU (HU above IU)	H'	40 [131]	-
Height between IU and IU	h1	15 [49]	-

HU: Heat source Unit, IU: Indoor Unit

*1 Refer to Figure 3-2-4 for possible pipe extension.

Table3-2-2-2. Bends equivalent length "M"

Heat source Model	M (m/bends [ft./bends])
PQHY-P144T/YSHMU	0.50 [1.64]
PQHY-P168T/YSHMU	0.50 [1.64]
PQHY-P192T/YSHMU	0.50 [1.64]
PQHY-P216T/YSHMU	0.50 [1.64]
PQHY-P240T/YSHMU	0.50 [1.64]

Table3-2-2-3. Piping "A" size selection rule **(mm [in.])**

Heat source and the first Joint	Pipe(Liquid)	Pipe(Gas)
CMY-Y100VBK2=CMY-Y202-G2	ø12.70[1/2]	ø28.58[1-1/8]*1
	ø15.88[5/8]	ø28.58[1-1/8]*2

*1 PQHY-P144T/YSHMU

*2 PQHY-P168-240T/YSHMU

CMY-Y100VBK2; PQHY-P144-240T/YSHMU

For Piping size "S","T", please refer to specification of the Twining kit CMY-Y100VBK2 at the Heat source unit's external drawing.

Table3-2-2-6. R410A Joint selection rule

Total down-stream Indoor capacity	Joint
~ P72	CMY-Y102S-G2
P73 ~ P144	CMY-Y102L-G2
P145 ~ P240	CMY-Y202-G2
P241 ~	CMY-Y302-G2

*PQHY-P192~240T/YHMU's first Joint is always CMY-Y202-G2;

*Concerning detailed usage of Joint parts, refer to its Installation Manual.

*The total capacity of the units in the downstream of the branch joint on at least one of the piping lines that are connected to the branch joint should be 240 or below.
If the total capacity of the units in the downstream of the branch joints on both lines is 240 or above use two branch joints (CMY-Y302-G2).

Table3-2-2-4. Piping"B","C","D","E" size selection rule **(mm [in.])**

Total down-stream Indoor capacity	Pipe(Liquid)	Pipe(Gas)
~ P54	ø9.52 [3/8]	ø15.88 [5/8]
P55 ~ P72	ø9.52 [3/8]	ø19.05 [3/4]
P73 ~ P108	ø9.52 [3/8]	ø22.20 [7/8]
P109 ~ P144	ø12.70 [1/2]	ø28.58 [1-1/8]
P145 ~ P240	ø15.88 [5/8]	ø28.58 [1-1/8]
P241 ~ P308	ø19.05 [3/4]	ø34.93 [1-3/8]
P309 ~	ø19.05 [3/4]	ø41.28 [1-5/8]

Table3-2-2-5. Piping"a","b","c","d","e","f","g" size selection rule **(mm [in.])**

Indoor Unit size	Pipe(Liquid)	Pipe(Gas)
P06,P08,P12,P15,P18	ø6.35 [1/4]	ø12.70 [1/2]
P27,P30,P36,P48,P54	ø9.52 [3/8]	ø15.88 [5/8]
P72	ø9.52 [3/8]	ø19.05 [3/4]
P96	ø9.52 [3/8]	ø22.20 [7/8]

Table3-2-2-7. R410A Header selection rule

	4-branch Header	8-branch Header	10-branch Header
	CMY-Y104-G	CMY-Y108-G	CMY-Y1010-G
Total down-stream Indoor capacity	<=P72	<=P144	<=P240

* CMY-Y104-G can directly connect PQHY-P72T/YHMU, but can NOT directly connect PQHY-P96T/YHMU or above;
* CMY-Y108-G can directly connect PQHY-P72~168T/Y(S)HMU, but can NOT directly connect PQHY-P192T/YSHMU or above;
* CMY-Y1010-G can directly connect PQHY-P72~240T/Y(S)HMU;
* CMY-Y104-G can NOT connect P72~P96 Indoor, but CMY-Y108,Y1010-G can do;
* Concerning detailed usage of Header parts, refer to its Installation Manual.

Note3. Indoor capacity is described as its model size;
For example, PEFY-P06NMAU-E, its capacity is P06;

Note4. Total down-stream Indoor capacity is the summary of the model size of Indoors downstream.
For example, PEFY-P06NMAU-E+PEFY-P08NMAU-E: Total Indoor capacity=P06+P08=P14

Note5. Piping sized determined by the Total down-stream indoor capacity is NOT necessary to be bigger than the up-stream one.
i.e. A>=B; A>=C>=D

3. PIPING DESIGN

3-2-3. PQHY-P264-360TSHMU/YSHMU Piping

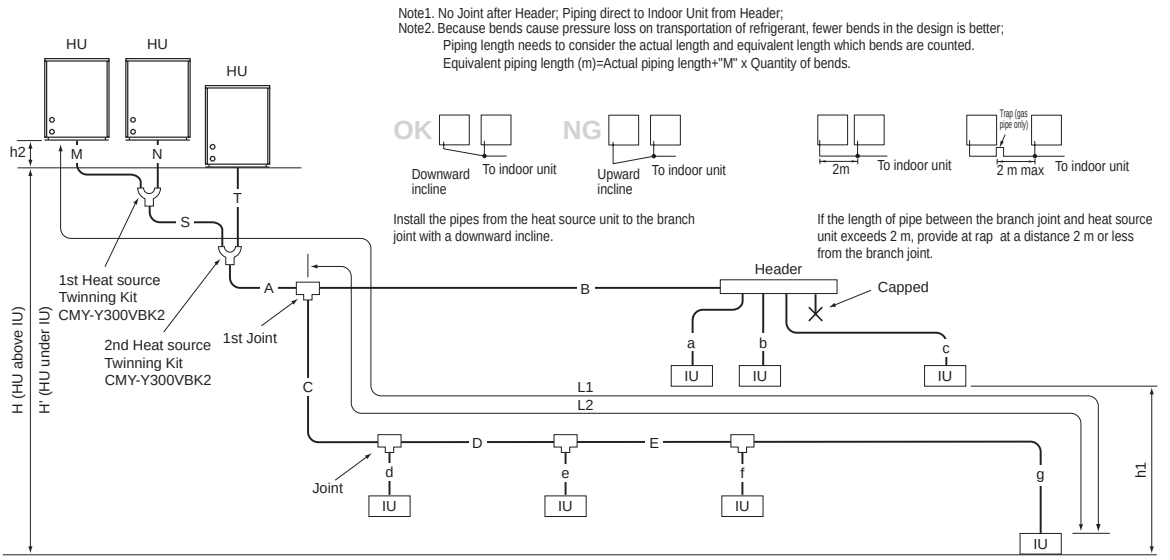


Fig. 3-2-1C Piping scheme

IU : Indoor unit , HU : Heat source unit

Table3-2-3-1. Piping length **(m [ft.])**

Item	Piping in the figure	Max. length	Max. equivalent length
Total piping length	S+T+M+N+A+B+C+D+E+a+b+c+d+e+f+g	500[1640]	-
Distance between HU and HU	M+N+S+T	10[32]	-
Height between HU and HU	h2	0.1[0.3]	-
Farthest IU from HU (L1)	M(N)+S+A+C+D+E+g / M(N)+S+A+B+c	165[541]	190[623]
Farthest IU from the first Joint (L2)	C+D+E+g / B+c	40[131] *1	40[131]
Height between HU and IU (HU above IU)	H	50[164]	-
Height between HU and IU (HU above IU)	H'	40[131]	-
Height between IU and IU	h1	15[49]	-

HU: Heat source Unit, IU: Indoor Unit

*1 Refer to Figure 3-2-4 for possible pipe extension.

Table3-2-3-2. Bends equivalent length "M"

Heat source Model	M (m/bends [ft./bends])
PQHY-P264T/YSHMU	0.70 [2.29]
PQHY-P288T/YSHMU	0.70 [2.29]
PQHY-P312T/YSHMU	0.70 [2.29]
PQHY-P336T/YSHMU	0.80 [2.62]
PQHY-P360T/YSHMU	0.80 [2.62]

Table3-2-3-3. Piping "A" size selection rule **(mm [in.])**

Heat source and the first Joint	Pipe(Liquid)	Pipe(Gas)
CMY-Y300VBK2=CMY-Y302-G2	ø19.05[3/4]	ø34.93[1-3/8] *1
	ø19.05[3/4]	ø41.28[1-5/8] *2

*1 PQHY-P264-312TSHMU/YSHMU
*2 PQHY-P336,360TSHMU/YSHMU
CMY-Y300VBK2;PQHY-P264-360T/YSHMU
For Piping size"M","N","S","T", please refer to specification of the Twining kit CMY-Y300VBK2 at the Heat source unit's external drawing.

Table3-2-3-6. R410A Joint selection rule

Total down-stream Indoor capacity	Joint
~ P72	CMY-Y102S-G2
P73 ~ P144	CMY-Y102L-G2
P145 ~ P240	CMY-Y202-G2
P241 ~	CMY-Y302-G2

*The total capacity of the units in the downstream of the branch joint on at least one of the piping lines that are connected to the branch joint should be 240 or below.
If the total capacity of the units in the downstream of the branch joints on both lines is 240 or above use two branch joints (CMY-Y302-G2).
*Concerning detailed usage of Joint parts, refer to its Installation Manual.

Table3-2-3-4. Piping"B","C","D","E" size selection rule **(mm [in.])**

Total down-stream Indoor capacity	Pipe(Liquid)	Pipe(Gas)
~ P54	ø9.52 [3/8]	ø15.88 [5/8]
P55 ~ P72	ø9.52 [3/8]	ø19.05 [3/4]
P73 ~ P108	ø9.52 [3/8]	ø22.20 [7/8]
P109 ~ P144	ø12.70 [1/2]	ø28.58 [1-1/8]
P145 ~ P240	ø15.88 [5/8]	ø28.58 [1-1/8]
P241 ~ P308	ø19.05 [3/4]	ø34.93 [1-3/8]
P309 ~	ø19.05 [3/4]	ø41.28 [1-5/8]

Table3-2-3-7. R410A Header selection rule

	4-branch Header	8-branch Header	10-branch Header
	CMY-Y104-G	CMY-Y108-G	CMY-Y1010-G
Total down-stream Indoor capacity	<=P72	<=P144	<=P240

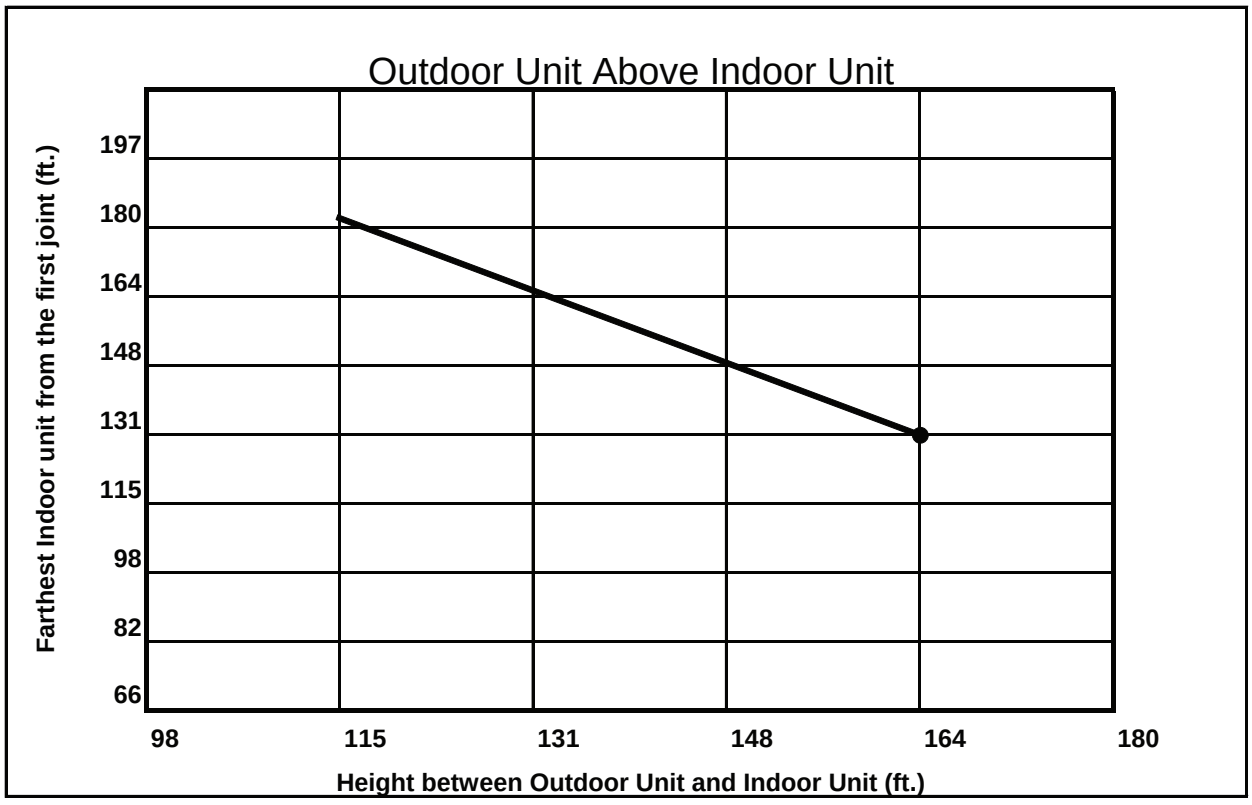
* CMY-Y104-G can directly connect PQHY-P72T/YHMU, but can NOT directly connect PQHY-P96T/YHMU or above;
* CMY-Y108-G can directly connect PQHY-P72~168T/Y(S)HMU, but can NOT directly connect PQHY-P192T/YSHMU or above;
* CMY-Y1010-G can directly connect PQHY-P72~240T/Y(S)HMU;
* CMY-Y104-G can NOT connect P72~P96 Indoor, but CMY-Y108,Y1010-G can do;
* Concerning detailed usage of Header parts, refer to its Installation Manual.

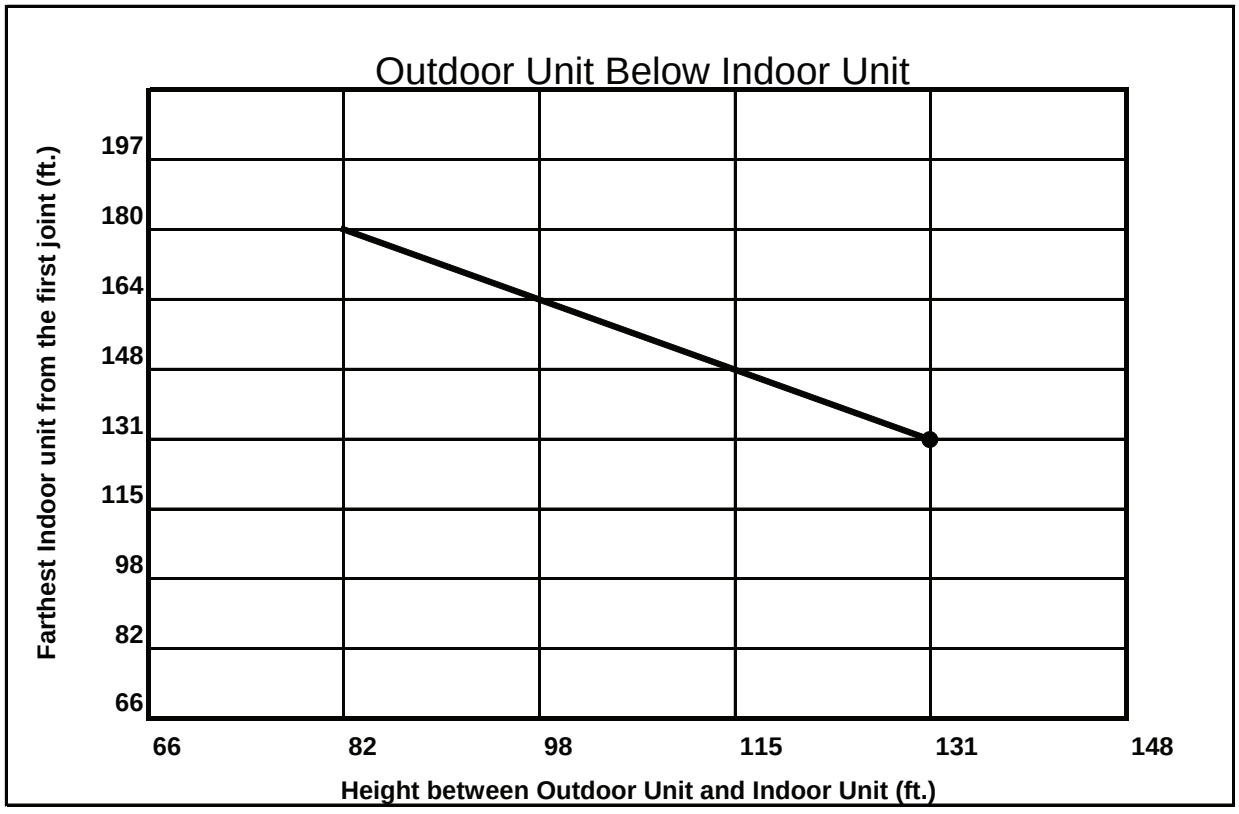
Table3-2-3-5. Piping"a","b","c","d","e","f","g" size selection rule **(mm [in.])**

Indoor Unit size	Pipe(Liquid)	Pipe(Gas)
P06,P08,P12,P15,P18	ø6.35 [1/4]	ø12.70 [1/2]
P27,P30,P36,P48,P54	ø9.52 [3/8]	ø15.88 [5/8]
P72	ø9.52 [3/8]	ø19.05 [3/4]
P96	ø9.52 [3/8]	ø22.20 [7/8]

Note3. Indoor capacity is described as its model size;
For example, PEFY-P06NMAU-E, its capacity is P06;
Note4. Total down-stream Indoor capacity is the summary of the model size of Indoors downstream.
For example, PEFY-P06NMAU-E+PEFY-P08NMAU-E: Total Indoor capacity=P06+P08=P14
Note5. Piping sized determined by the Total down-stream indoor capacity is NOT necessary to be bigger than the up-stream one.
i.e. A>=B; A>=C>=D

3-2-4. Farthest Indoor Unit from First Joint Requirements





3-3. Refrigerant Charging Calculation

At the time of shipping, the heat source unit is charged with the refrigerant. As this charge does not include the amount needed for extended piping, additional charging for each refrigerant line will be required on site. In order that future servicing may be properly provided, always keep a record of the size and length of each refrigerant line and the amount of additional charge by writing it in the space provided on the heat source unit.

(1) Calculation of additional refrigerant charge

- Calculate the amount of additional charge based on the length of the piping extension and the size of the refrigerant line.
- Use the table to the below as a guide to calculating the amount of additional charging and charge the system accordingly.
- If the calculation results in a fraction of less than 0.1kg[1oz], round up to the next 0.1kg[1oz]. For example, if the result of the calculation was 12.38kg[435.1oz], round the result up to 12.4kg[436oz].

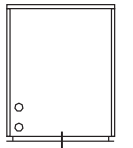
<Additional Charge>

Additional refrigerant charge	=	Total length of liquid pipe sized ø19.05 [3/4"]	+	Total length of liquid pipe sized ø15.88 [5/8"]	+	Total length of liquid pipe sized ø12.7 [1/2"]	+	Total length of liquid pipe sized ø9.52 [3/8"]	+	Total length of liquid pipe sized ø6.35 [1/4"]	+ α
(kg) (oz)		(m) x 0.29 (kg/m) (ft.) x 3.1 [oz/ft.]		(m) x 0.20 (kg/m) (ft.) x 2.15 [oz/ft.]		(m) x 0.12 (kg/m) (ft.) x 1.29 [oz/ft.]		(m) x 0.06 (kg/m) (ft.) x 0.65 [oz/ft.]		(m) x 0.024 (kg/m) (ft.) x 0.26 [oz/ft.]	

Table3-2-4-1. Value of α

Total capacity of connecting indoor units	α	
Models ～ 27	2.0 kg	[71 oz]
Models 28～ 54	2.5 kg	[89 oz]
Models 55～126	3.0 kg	[106 oz]
Models 127～144	3.5 kg	[124 oz]
Models 145～180	4.5 kg	[160 oz]
Models 181～234	5.0 kg	[177 oz]
Models 235～273	6.0 kg	[212 oz]
Models 274～307	8.0 kg	[283 oz]
Models 308～342	9.0 kg	[318 oz]
Models 343～411	10.0 kg	[353 oz]
Models 412～480	12.0 kg	[424 oz]
Models 481～	14.0 kg	[494 oz]

Example: PQHY-P120THMU/YHMU



m [kg]

Indoor 1: P48 A: ø12.7 40 m a: ø9.52 10 m
2: P36 B: ø9.52 10 m b: ø9.52 5 m
3: P15 C: ø9.52 15 m c: ø6.35 10 m
4: P12 D: ø9.52 10 m d: ø6.35 10 m
5: P24 e: ø9.52 10 m

The total length of liquid pipe of each size is as follows:
ø12.7 : A= 40 = 40 m
ø9.52 : B + C + D+ a + b + e = 10 + 15 + 10 + 10 + 5 + 10 = 60 m
ø6.35 : c +d = 10 + 10 = 20 m

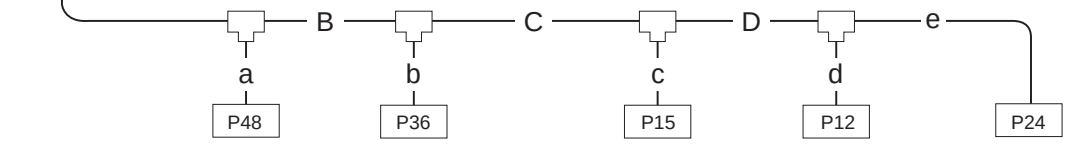
Total capacity of connecting Indoor units Pt :
Pt = P48 + P36 + P15 + P12 + P24 = P135, therefore α = 3.5kg

ft. [oz]

Indoor 1: P48 A: ø1/2" 131ft. a: ø3/8" 32ft.
2: P36 B: ø3/8" 32ft. b: ø3/8" 16ft.
3: P15 C: ø3/8" 49ft. c: ø1/4" 32ft.
4: P12 D: ø3/8" 32ft. d: ø1/4" 32ft.
5: P24 e: ø3/8" 32ft.

The total length of liquid pipe of each line is as follows:
ø1/2" : A= 131 = 131ft.
ø3/8" : B + C + D+ a + b + e= 32 + 49 + 32 + 32 + 16 + 32 = 193ft.
ø1/4" : c + d = 32 + 32 = 64ft.

Total capacity of connecting Indoor units Pt :
Pt = P48 + P36 + P15 + P12 + P24 = P135, therefore α = 124oz



m [kg]

Additional refrigerant charge	=	Total length of liquid pipe sized ø19.05 x 0.29 (kg/m)	+	Total length of liquid pipe sized ø15.88 x 0.20 (kg/m)	+	Total length of liquid pipe sized ø12.7 x 0.12 (kg/m)	+	Total length of liquid pipe sized ø9.52 x 0.06 (kg/m)	+	Total length of liquid pipe sized ø6.35 x 0.024 (kg/m)	+ 3.5
(kg)		0 (m) x 0.29 (kg/m)		0 (m) x 0.20 (kg/m)		40 (m) x 0.12 (kg/m)		60 (m) x 0.06 (kg/m)		20 (m) x 0.024 (kg/m)	

= 0 + 0 + 40 x 0.12 + 60 x 0.06 + 20 x 0.024 + 3.5
= 12.4 kg

or

ft. [oz]

Additional refrigerant charge	=	Total length of liquid pipe sized ø3/4" x 3.1 (oz/ft.)	+	Total length of liquid pipe sized ø5/8" x 2.15 (oz/ft.)	+	Total length of liquid pipe sized ø1/2" x 1.29 (oz/ft.)	+	Total length of liquid pipe sized ø3/8" x 0.65 (oz/ft.)	+	Total length of liquid pipe sized ø1/4" x 0.26 (oz/ft.)	+ 124
(oz)		0 (ft.) x 3.1 (oz/ft.)		0 (ft.) x 2.15 (oz/ft.)		131 (ft.) x 1.29 (oz/ft.)		193 (ft.) x 0.65 (oz/ft.)		64 (ft.) x 0.26 (oz/ft.)	

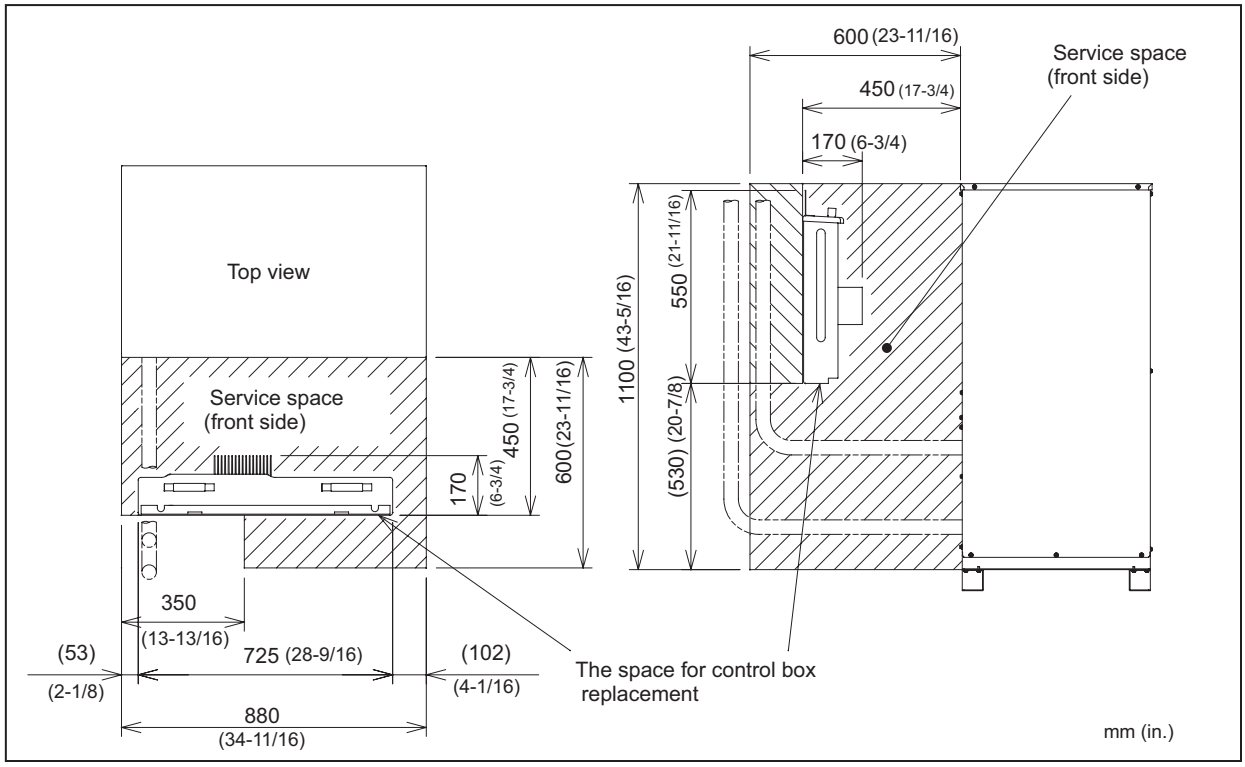
= 0 + 0 + 131 x 1.29 + 193 x 0.65 + 64 x 0.26 + 124
= 436 [oz]

4-1. PQHY-P-T(S)HMU/Y(S)HMU's Installation

1. Install indoors; avoid exposing the unit to outside elements.
2. Do not install in an area where it could be subjected to direct heat.
3. Avoid installing the unit in a location where the operating sound could be an annoyance.
4. Install on a stable, load-bearing surface.
5. Ensure there is adequate drain flow from the unit when in heating mode;
6. See space requirements for installation and maintenance;
7. Do not install the unit in an environment that may have combustible gas, oil, steam, chemical gas like acidic solutions, sulfur gas, etc.
8. Make sure the declining gradient of the exhaust pipe is higher than 1/100.

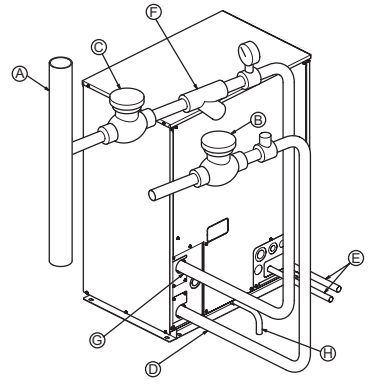
4-2. Installation Space

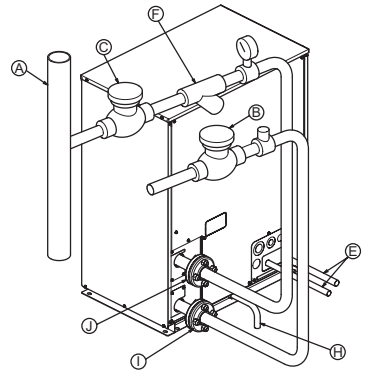
In case of a single unit installation, 23-11/16 in. (600mm) or more of clearance space in the front of the unit makes for easier access when servicing the unit.



4-3. Piping Direction

<Model : PQHY, PQRY-P-THMU-A/YHMU-A>





Ⓐ Main circulating water pipe
Ⓑ Shutoff valve
Ⓒ Shutoff valve
Ⓓ Water outlet (lower)
Ⓔ Refrigerant pipes
Ⓕ Y-type strainer
Ⓖ Water inlet (upper)
Ⓗ Drain pipe
Ⓘ Water outlet flange (lower)
Ⓙ Water intlet flange (upper)

1. Insulation installation

With City Multi WY/ WR2 Series piping, as long as the temperature range of the circulating water is kept to average temperatures year-round (29.4°C[85°F] in the summer, 21.1°C[70°F] in the winter), there is no need to insulate or otherwise protect indoor piping from exposure. You should use insulation in the following situations:

- Any heat source piping.
- Indoor piping in cold-weather regions where frozen pipes are a problem.
- When air coming from the outside causes condensation to form on piping.
- Any drainage piping.

2. Water processing and water quality control

To preserve water quality, use the closed type of cooling tower for WY/ WR2. When the circulating water quality is poor, the water heat exchanger can develop scales, leading to a reduction in heat-exchange power and possible corrosion of the heat exchanger. Please pay careful attention to water processing and water quality control when installing the water circulation system.

- Removal of foreign objects or impurities within the pipes.
  During installation, be careful that foreign objects, such as welding fragments, sealant particles, or rust, do not enter the pipes.
- Water Quality Processing

① Depending on the quality of the cold-temperature water used in the air conditioner, the copper piping of the heat exchanger may become corroded. We recommend regular water quality processing.
Cold water circulation systems using open heat storage tanks are particularly prone to corrosion.
When using an open-type heat storage tank, install a water-to-water heat exchanger, and use a closed-loop circuit on the air conditioner side. If a water supply tank is installed, keep contact with air to a minimum, and keep the level of dissolved oxygen in the water no higher than 1mg/ℓ.

② Water quality standard

Items			Lower mid-range temperature water system		Tendency	
			Recirculating water [20<T<60°C] [68<T<140°F]	Make-up water	Corrosive	Scale-forming
Standard items	pH (25°C)[77°F]		7.0 ~ 8.0	7.0 ~ 8.0	○	○
	Electric conductivity	(mS/m) (25°C)[77°F]	30 or less	30 or less	○	○
		(μS/cm) (25°C)[77°F]	[300 or less]	[300 or less]		
	Chloride ion	(mg Cl^-/ ℓ)	50 or less	50 or less	○	
	Sulfate ion	(mg SO_4^{2-}/ ℓ)	50 or less	50 or less	○	
	Acid consumption (pH4.8)	(mg $CaCO_3$/ ℓ)	50 or less	50 or less		○
	Total hardness	(mg $CaCO_3$/ ℓ)	70 or less	70 or less		○
	Calcium hardness	(mg $CaCO_3$/ ℓ)	50 or less	50 or less		○
	Ionic silica	(mg SiO_2/ ℓ)	30 or less	30 or less		○
Reference items	Iron	(mg Fe/ ℓ)	1.0 or less	0.3 or less	○	○
	Copper	(mg Cu/ ℓ)	1.0 or less	0.1 or less	○	
	Sulfide ion	(mg S^{2-}/ ℓ)	not to be detected	not to be detected	○	
	Ammonium ion	(mg NH_4^+/ ℓ)	0.3 or less	0.1 or less	○	
	Residual chlorine	(mg Cl/ ℓ)	0.25 or less	0.3 or less	○	
	Free carbon dioxide	(mg CO_2/ ℓ)	0.4 or less	4.0 or less	○	
	Ryzner stability index		–	–	○	○

Reference : Guideline of Water Quality for Refrigeration and Air Conditioning Equipment. (JRA GL02E-1994)

③ Please consult with a water quality control specialist about water quality control methods and water quality calculations before using anti-corrosive solutions for water quality management.

④ When replacing a previously installed air conditioning device (even when only the heat exchanger is being replaced), first conduct a water quality analysis and check for possible corrosion.
Corrosion can occur in cold-water systems even if there has been no prior signs of corrosion. If the water quality level has dropped, please adjust water quality sufficiently before replacing the unit.

The installer and/or air conditioning system specialist shall follow safety guidelines in reference to refrigerant leakage according to local regulations or standards. The following standards may be applicable if no local regulation or standard is available.

5-1. Refrigerant Properties

R410A refrigerant is harmless and incombustible. The R410A is heavier than the indoor air in density. Leakage of the refrigerant in a room has possibility to lead to a hypoxia situation. Therefore, the Critial concentration specified below shall not be exceeded even if the leakage happens.

- **Critical concentration**

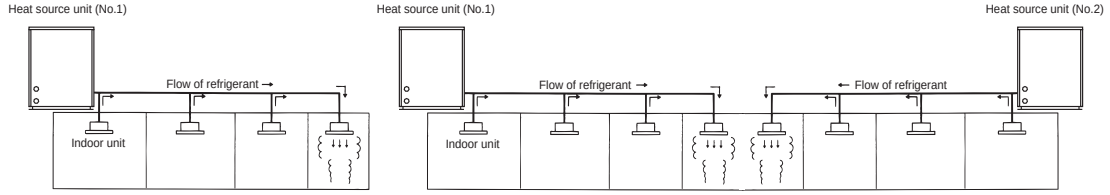
Critical concentration hereby is the refrigerant concentration in which no human body would be hurt if immediate measures can be taken when refrigerant leakage happens.

Critical concentration of R410A: 0.30kg/m^3
(The weight of refrigeration gas per 1 m^3 air conditioning space.);
* The Critical concentration is subject to ISO5149, EN378-1.

For the CITY MULTI system, the concentration of refrigerant leaked should not have a chance to exceed the Critical concentration in any situntion.

5-2. Confirm the Critical Concentration and Perform Countermeasures

The maximum refrigerant leakage concentration (Rmax) is defined as the result of the possible maximum refrigerant weight (Wmax) leaked into a room divided by its room capacity (V). It is referable to Fig. 5-1. The refrigerant of Heat source unit here includes its original charge and additional charge at the site.
The additional charge is calculated according to the refrigerant charging calculation of each kind of Heat source unit, and shall not be over charged at the site. Procedure 5-2-1~3 tells how to confirm maximum refrigerant leakage concentration (Rmax) and how to take countermeasures against a possible leakage.



Maximum refrigerant leakage concentration (Rmax)
Rmax=Wmax / V (kg/m^3)

Maximum refrigerant leakage concentration (Rmax)
Rmax=Wmax / V (kg/m ^{3}) W1: Refrigerant weight of Heat source unit No.1
where, Wmax=W1+W 2 W2: Refrigerant weight of Heat source unit No.2

Fig. 5-1 The maximum refrigerant leakage concentration

5-2-1.Find the room capacity (V),
If a room having total opening area more than 0.15% of the floor area at a low position with another room/space, the two rooms/space are considered as one. The total space shall be added up.
5-2-2.Find the possible maximum leakage (Wmax) in the room. If a room has Indoor unit(s) from more than 1 Heat source unit, add up the refrigerant of the Heat source units.
5-2-3.Divide (Wmax) by (V) to get the maximum refrigerant leakage concentration (Rmax).
5-2-4.Find if there is any room in which the maximum refrigerant leakage concentration (Rmax) is over 0.30kg/m^3.
If no, then the CITY MULTI is safe against refrigerant leakage.
If yes, following countermeasure is recommended to do at site.
Countermeasure 1: Let-out (making V bigger)
Design an opening of more than 0.15% of the floor area at a low position of the wall to let out the refrigerant whenever leaked.
e.g. make the upper and lower seams of door big enough.
Countermeasure 2: Smaller total charge (making Wmax smaller)
e.g. Avoid connecting more than 1 Heat source unit to one room.
e.g. Using smaller model size but more Heat source units.
e.g. Shorten the refrigerant piping as much as possible.
Countermeasure 3: Fresh air in from the ceiling (Ventilation)
As the density of the refrigerant is bigger than that of the air. Fresh air supply from the ceiling is better than air exhausting from the ceiling. Fresh air supply solution refers to Fig. 5-2~4.

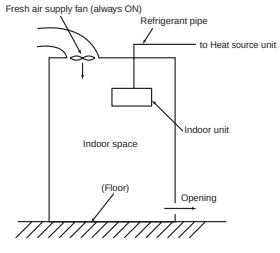


Fig.5-2. Fresh air supply always ON

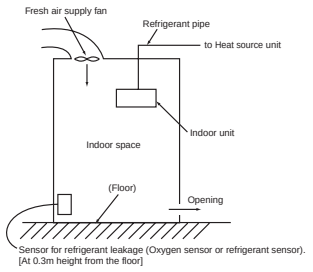


Fig.5-3. Fresh air supply upon sensor action

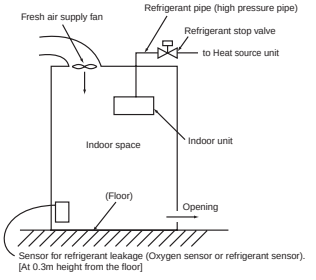


Fig.5-4. Fresh air supply and refrigerant shut-off upon sensor action

Note 1. Countermeasure 3 should be done in a proper way in which the fresh air supply shall be on whenever the leakage happens.
Note 2. In principle, MITSUBISHI ELECTRIC requires proper piping design, installation and air-tight testing after installation to avoid leakage happening.
In the area should earthquake happen, anti-vibration measures should be fully considered.
The piping should consider the extension due to the temperature variation.